Harris County
Public Health
Building a Healthy Community

Leading *Causes of* **Death** in Harris County **2016-2020**

A HARRIS COUNTY PUBLIC HEALTH REPORT

Compiled by
Office of Epidemiology,
Surveillance, and Evaluation
Office of Planning and Innovation
Harris County Public Health

December
2021

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EXECUTIVE SUMMARY

2016-2020

Background

Life expectancy[1], mortality[2], and infant mortality[3] are key indicators of the overall health of a population. Cause-of-death ranking is a standard method that is used to illustrate the relative burden of diseases or external causes of death.

Harris County Public Health (HCPH) evaluated the annual mortality burden and their contributing factors in Harris County, Texas from 2016 to 2020. Mortality and leading causes of death are used as the major measurements for population health. Crude mortality rates are used to describe trends in overall death counts, while accounting for the population size. Age-adjusted mortality rates are used for comparative mortality analysis, while accounting for the age structure of the populations being compared because age is a prime factor in mortality.

COVID-19 mortality was also evaluated for 2020 to include the impacts of the pandemic on death trends. Data sources included vital statistics from the Texas Department of State Health Services (DSHS) and the American Community Survey (ACS) estimates from the U.S. Census Bureau. The vital statistics data for 2020 were provisional.

For expanded terms and definitions, please refer to the technical notes section at the end of the report.

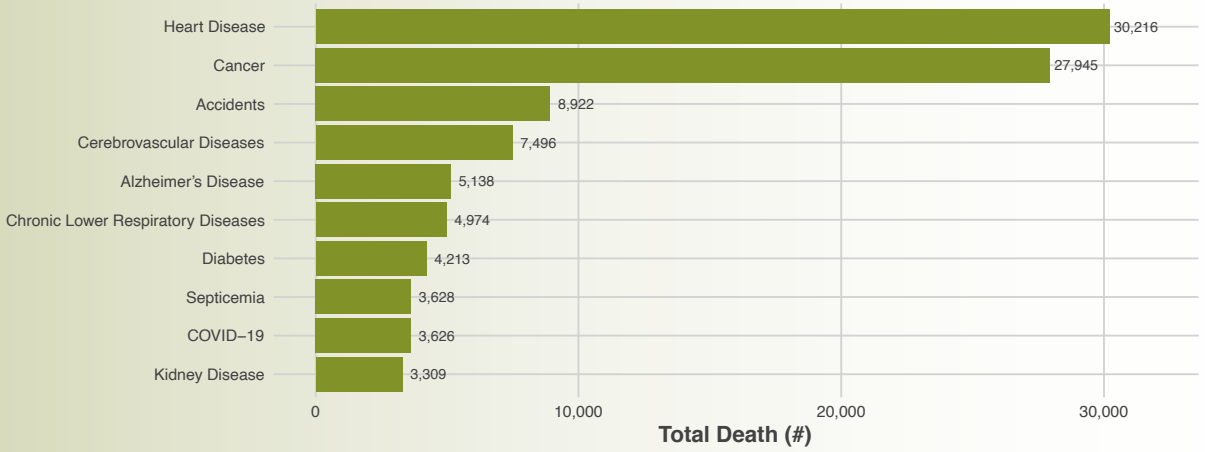
Purpose

The purpose of this report is to inform stakeholders - including policy makers, local health systems, providers, Commissioners Court, County Department leadership, other key decision makers, and the community at large on the leading causes of death in Harris County. HCPH hopes this report informs and guides the work of these stakeholders to address adverse health outcomes in the community.

More specifically, the data collected can inform our health promotion and prevention efforts, focus on the causes of premature death, highlight disparities among populations, and show the need to engage in prevention efforts, whether it is to reduce for example, cancer deaths or infant mortality.

[1] Life expectancy refers to how long a person in a community is expected to live.
[2] Mortality refers to the rate of death or the number of deaths in a group(s) of people in a given time period (shown as per 100,000 persons).
[3] Infant mortality refers to rate of death among infants between 0-12 months or reach to their first birthday.

Ten Leading Causes of Death by Total Death Count in Harris County, 2016-2020



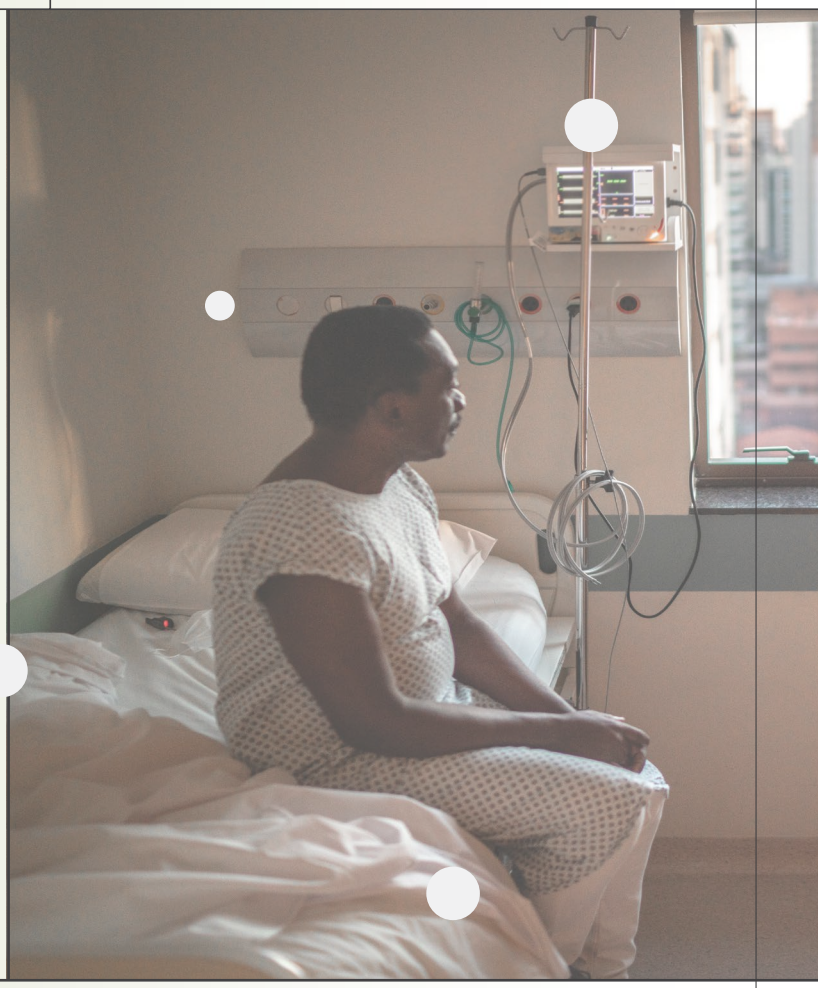
Summary of Data

- From 2016 to 2019, the total number of deaths or death count remained similar to previous years. The all-cause mortality rate remained stable or trended down. However, in 2020, the rate increased most due to the COVID-19 pandemic, though other causes of death contributed to the increase as well.
- From 2016 to 2020, there were 138,924 deaths with 1,994 unique ICD-10 (International Classification of Diseases Tenth Revision) codes documented for various causes of death.
- By total count, the ten leading causes of death accounted for 71.6% of total deaths in Harris County.
- Chronic diseases continue to be the major cause of death in Harris County, with heart disease and cancer accounting for 41.9% of all deaths. Adding accidents, these three leading causes accounted for 48.3% of all deaths during the five years between 2016-2020.
- Although it did not occur until March 2020, COVID-19 is the ninth leading cause of death during all five years, and the third leading cause of death in 2020.

"Heart **disease** and *cancers* accounted for **41.9%** of all deaths"

Key Data by Sex (2016-2020)

- Men consistently had a higher mortality rate than women during all five years.
- Both men and women shared the two top causes of death: heart disease and cancer.
- Heart disease, accidents, chronic lower respiratory disease, suicide, homicide diabetes, and COVID-19 were the higher ranked causes of death for men.
- Cancer, cerebrovascular disease, Alzheimer's disease, septicemia, and kidney disease were the higher ranked causes of death for women.



Key Data by Race/Ethnicity (2016-2020)

- Heart disease was the leading cause of death for both African Americans/Blacks (Blacks) Whites.
- Cancer was the leading cause of death for both Asians/Pacific Islanders (APIs) and Hispanics.
- Homicide was the sixth leading cause of death for Blacks.
- Suicide was the ninth leading cause of death for Whites and APIs.
- Black infants and children had the highest mortality rates among all races/ethnicities.
- Blacks had the highest all-cause mortality rate among all races/ethnicities younger than 80 years of age.

Five Leading Causes of Death By Age Group

- 1 year and under – congenital malformation, low birth weight, maternal complications, sudden infant death syndrome (SIDS), and bacterial sepsis accounted for 51.7% of total infant deaths.
- 1-17 years – accident, homicide, cancer, suicide, and congenital malformation accounted for 65.2% of total deaths.
- 18-39 years – accident, homicide, suicide, cancer, and heart diseases accounted for 75.1% of total deaths.
- 40-59 years – cancer, heart disease, accidents, chronic liver disease and cirrhosis, and cerebrovascular disease accounted for 62.3% of total deaths.
- 60-79 years – cancer, heart disease, cerebrovascular diseases, chronic lower respiratory diseases, and diabetes accounted for 62.7% of total deaths.
- 80 years or older- heart disease, cancer, Alzheimer's disease, cerebrovascular diseases, and chronic lower respiratory disease accounted for 60.8% of total deaths.

Impact of COVID-19 on Mortality in 2020

- Heart disease and cancer remained the top two leading causes of death. COVID-19 was the third leading cause of death in 2020 for both men and women, and the ninth leading cause of death during all five years.
- The all-cause mortality in the first year of the COVID-19 pandemic was the highest between 2016 and 2020.
- 76.3% of Harris County COVID-19 deaths in 2020 were among residents aged 60 or older.
- The COVID-19 mortality rate increased with age and was highest in those who were aged 80 or older.
- The COVID-19 age-adjusted mortality rate was the highest among Hispanics.
- COVID-19 was the fourth leading cause of death for Hispanics and the sixth leading cause of death for APIs between 2016 and 2020. COVID-19 was the first leading cause of death for Hispanics and the third leading cause of death for APIs and Blacks in 2020.

Yearly Mortality, 2016-2020

There were 138,924 total deaths between 2016 and 2020 in Harris County. People 18 years of age and older accounted for 97.7% of the total deaths. The table below shows the annual count, crude, and age-adjusted mortality rates for all causes of death during these years.

Crude mortality rates explain trends in overall death counts relative to population size. Age-adjusted or age-standardized mortality rates are used for comparative mortality analysis and adjusted for the age distribution of populations being compared as age is a prime factor in mortality.

Note: Crude mortality rates explain trends in overall death counts relative to population size. Age-adjusted or age-standardized mortality rates are used for comparative mortality analysis and adjust for age distribution of populations being compared as age is a prime factor in mortality.

Yearly Total Death Count and All-Cause Mortality Rate in Harris County, 2016-2020

Year	Total Death	Population	Crude Mortality Rate (per 100k persons)	Age-Adjusted Mortality Rate (per 100k persons)
2016	25,889	4,623,960	560	709
2017	26,663	4,657,972	572	708
2018	26,966	4,680,045	576	699
2019	26,665	4,713,325	566	670
2020	32,741	4,713,325	695	817

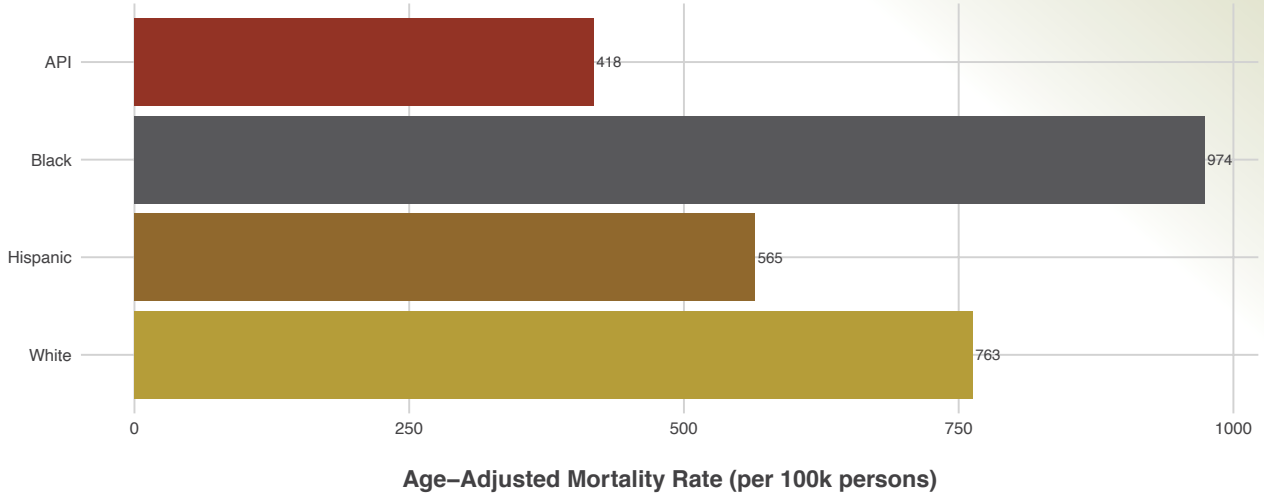
"The **death** count *increased* by 22.8% ... in **2020**"

Between 2016 and 2019, the total death count remained stable. The age-adjusted mortality rate declined in 2018 and 2019 compared to 2016. However, this downward trend was reversed in 2020 due to COVID-19 related and unrelated deaths. The death count increased by 22.8% and the age-adjusted mortality rate increased by 21.9% in 2020 compared to 2019. It should be noted that the death count increased by 9.19% in 2020 compared to the death count in 2019, even when 3,626 COVID-19 deaths were not considered. This observation suggests that the COVID-19 pandemic had a significant negative affect on the overall mortality rate in 2020.

Five-Year Mortality

The overall mortality rate between 2016 and 2020 was 721 per 100,000 persons. Men's mortality rates were higher than women's (852 vs. 610 per 100,000 persons for men and women respectively). The figure below shows Blacks had the highest mortality rate (974 per 100,000 persons), followed by Whites (763 per 100,000 persons) and then Hispanics (565 per 100,000 persons). APIs had the lowest mortality rate (418 per 100,000 persons).

All-Cause Age-Adjusted Mortality Rate by Race/Ethnicity in Harris County, 2016-2020

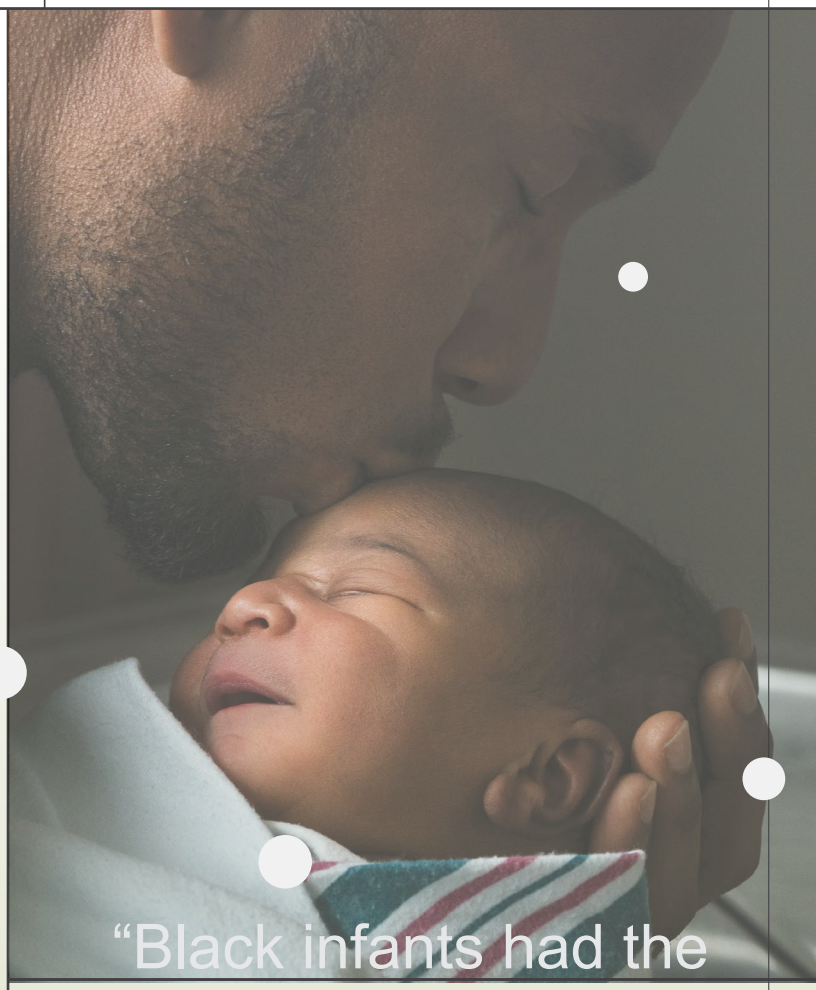


Infant and Child Mortality

A total of 3,239 children aged 17 and under died between 2016 and 2020 in Harris County, including 2,037 infant deaths (12 months or younger). The yearly infant mortality rate varied from 534 to 618 per 100,000 persons, and from 5.82 to 6.32 per 1,000 live births. The child mortality rate (aged 1-17 years) varied from 19.5 to 21.1 per 100,000 persons during these five years.

The infant mortality rates have declined gradually during these five years with the lowest rate in 2020 compared to previous years. Male infants and children had a higher mortality rate than female infants and children during all five years.

Black infants had the highest mortality rate, which was more than double the rate of other racial/ethnic groups. The mortality rate was 14.8 (per 1000 live births) for Black infants, 6.51 for Hispanic infants, 5.43 for White infants, and 3.83 for API infants. Black children aged 1-17 also had the highest mortality rate, which was almost double the rate of other racial/ethnic groups. A total of 42.5% infant deaths and 45.6% of child deaths were Hispanics. A total of 37.2% infant deaths and 30.4% of child deaths were Blacks. API infants and children had the lowest mortality rate between 2016 and 2020.



"Black infants had the **highest** mortality rate, which was ***more than*** double of the rate of other racial/ethnic groups. The **mortality** rate was ***14.8*** (per 1000 live births) for Black infants..."

COVID-19 in 2020

There were 3,626 COVID-19 deaths in Harris County in 2020 with 76.3% having occurred in residents 60 years of age or older. The COVID-19 mortality rate increased with age and was the highest in those 80 years of age or older. There were no COVID-19 deaths among young residents (0-9 years). COVID-19 caused five deaths among those who were 10-19 years old, all of whom were Hispanic. The figure below shows that Hispanics had the highest COVID-19 age-adjusted mortality rate, followed by Blacks and Whites. APIs had the lowest COVID-19 mortality rate. COVID-19 was the leading cause of death in Hispanic residents and accounted for 22.4% of the total deaths in Hispanics.

COVID-19 Age-Adjusted Mortality Rate by Race/Ethnicity in Harris County, 2020

Notable Trend

The death count for most of the ten leading causes remained stable between 2016 and 2019. The death count for diabetes increased by 15.0% in 2019 compared to 2018. The death count for septicemia dropped by 36.3% in 2019 compared to 2018. In 2020, the death count increased by 11.5% for heart disease, 20.5% for accidents, 11.9% for Alzheimer's disease, 13.2% for diabetes, and 22.9% for septicemia, compared to 2019. The death count for chronic lower respiratory disease decreased by 12.9% in 2020.

The death counts from all underlying causes (by a single ICD code) were largely stable or trending downward between 2016 and 2020. However, some causes show an upward trend through these five years, including:

- Liver Cancer
- Endometrial Cancer
- Diabetes
- Alzheimer's Disease
- Senile Degeneration of Brain
- Specified Degenerative Disease of the Nervous System
- Cerebral Infarction
- Unspecified Bacterial Pneumonia
- Unintentional Drug Overdose

Leading *Causes of* **Death** in Harris County

The death counts for some causes had been stable, but increased by more than 30% in 2020 compared to 2019, including:

- Kidney Cancer
- Multiple Myeloma
- Severe Malnutrition
- Alcohol Dependence
- Cardiac Arrhythmia
- Parkinson's Disease
- Degenerative Diseases of Nervous The System
- Alcoholic Cirrhosis of Liver
- Sudden Infant Death Syndrome
- Unintentional Drug Overdose
- Homicide

Deaths due to unintentional drug overdose, degenerative diseases of nervous system, alcohol dependence, and multiple myeloma increased by more than 60%, whereas the deaths due to falls increased by 26.4% in 2020 compared to 2019.

"The **COVID-19** pandemic *reversed* the declining **mortality** *as* seen in **2019**"

Conclusion

In summary, the mortality rate rose in Harris County in 2020 after being stable between 2016 and 2019. The total number of deaths increased by 22.8% and the age-adjusted mortality rate increased by 21.9% in 2020 compared to 2019. The increased mortality rate was not only due to COVID-19, but also due to other causes, such as heart disease, diabetes, substance use (drugs or alcohol), and Alzheimer's disease. Lastly, there were disparities by age, sex, and race/ethnicity shown for both mortality rate and leading causes of death.

In 2020, the COVID-19 pandemic significantly contributed to the increased mortality in Harris County. The short- and long-term impact of COVID-19 and its effect on the mortality rate should be monitored. This report is intended to better inform the public, governmental agencies, elected officials, and others on the emerging and persistent health issues the County faces to lead to active solutions to address the underlying and root causes of these leading causes of death.

This section will discuss the various kinds of demographics that make up the population, such as race, age and sex in Harris County. It also includes social characteristics about where people live within the County as well as life expectancy.

Harris County is home to Houston, the fourth largest city in the U.S. It is also the most populous county in Texas and the third most populous county in the U.S. With a population of more than 4.7 million in 2021, it is one of the fastest growing counties in Texas and the nation. There are four Precincts in Harris County, each with a population of over one million. Ethnically diverse immigrants drive the growth of Harris County and the surrounding regions, with 26.1% of residents being foreign-born and 44.4% of residents speaking languages other than English at home in 2019.

In 2019, the population size of Harris County was estimated to be 4,713,325. Approximately 16.0% of the population was 60 years or older, and 29.4% was 20 years and under (Table 1.1). The median age of county residents was 33.9 years, which was younger than the entire U.S. population with a median age of 38.2 years. The median age of Harris County residents increased slightly year by year between 2016 and 2020. Whites are the majority among those over 65 years old.

"There are **four** Precincts in *Harris County*, each with a population of over **one million**."

Section 1: Demographics **and** *Social* **Characteristics**

Table 1.1 Age Distribution in Harris County, 2019

Age Group (years)	Population	Percentage (%)
0-9	694,769	14.74
10-19	672,923	14.28
20-29	692,699	14.70
30-39	730,516	15.50
40-49	625,530	13.27
50-59	543,135	11.52
60-69	425,765	9.03
70-79	222,311	4.72
80+	105,677	2.24

The sex ratio, or number of men to women, is nearly equal with the number of women being slightly higher in Harris County (Table 1.2).

Table 1.2 Sex Distribution in Harris County, 2019

Sex	Population	Percentage (%)
Women	2,373,882	50.4
Men	2,339,443	49.6

Racial/ethnic makeup is approximately 43.7% Hispanic, 28.7% White, 18.8% Black, and 7.2% APIs (Table 1.3).

Table 1.3 Race/Ethnicity Distribution in Harris County, 2019

Race/Ethnicity	Population	Percentage (%)
API	337,604	7.2
Black	886,956	18.8
Hispanic	2,061,019	43.7
Others	74,668	1.6
White	1,353,078	28.7

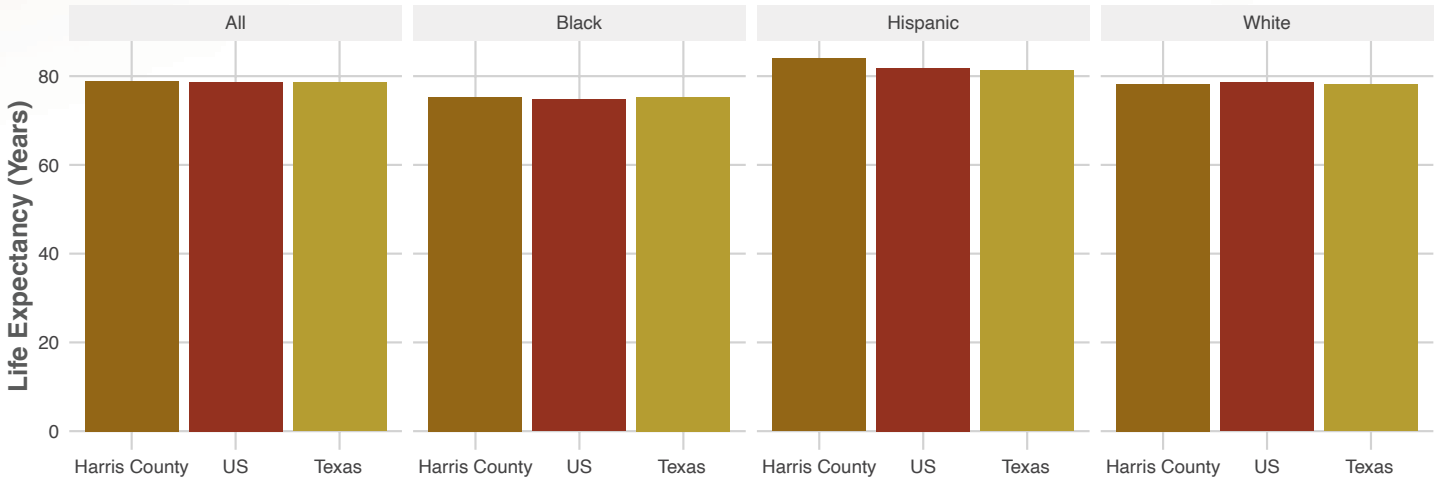
Note: API: Asian/Pacific Islander

Section 2: Average *Life* **Expectancy**

Life expectancy is the average number of years a person in a defined community can expect to live based on the current mortality rates. Life expectancy at birth for Harris County residents was 79.9 years in 2021, similar to 79.2 years for the state of Texas. Life expectancy across the nation is expected to decrease by 1.5 years from 2019 to 2020 due to the COVID-19 pandemic.

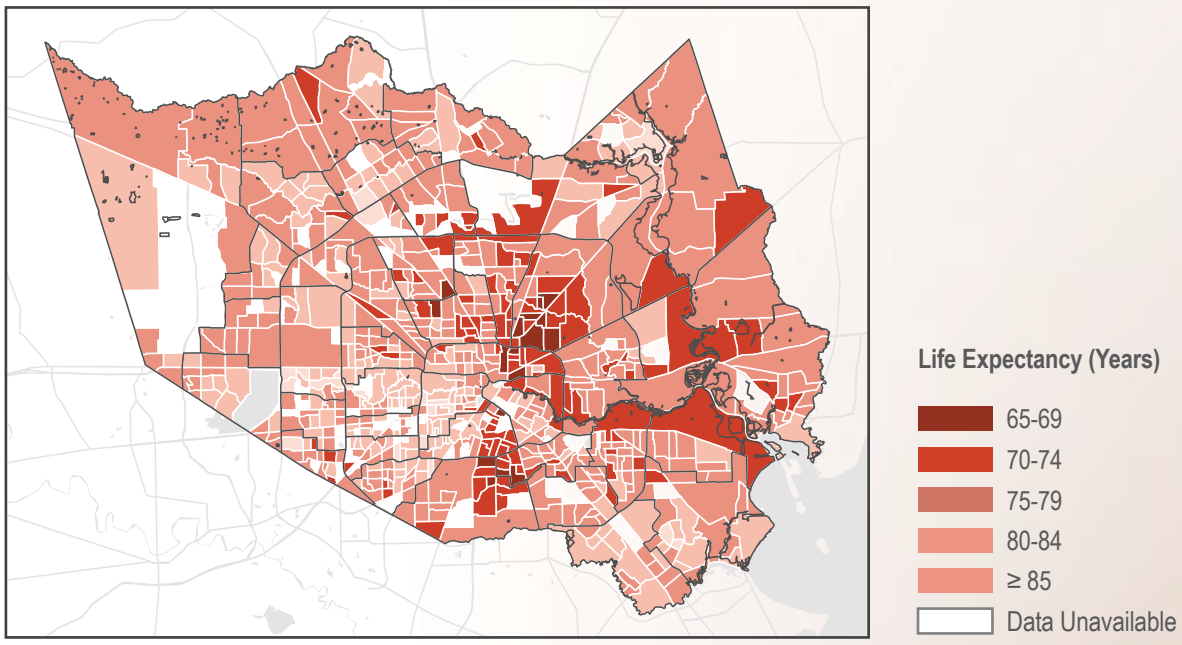
Average life expectancies differ by sex and race/ethnicity. Women on average have a longer life expectancy than men. Women tend to live five years longer than men according to the data of 2014. Figure 2.1 shows the life expectancy overall and by race/ethnicity in 2018. Hispanics had the highest life expectancy at 83.9 years, followed by Whites at 78.2 years and Blacks with 75.3 years. Black men had the lowest life expectancy at 72.3 years.

Figure 2.1 Life Expectancy at Birth Overall and by Race/Ethnicity in Harris County, Texas, and United States 2018



Life expectancy differs by location within Harris County. Detailed life expectancy data at the subcounty level for 2016-2020 is not available. Based on the data of 2010-2015, life expectancies differ by census tracts by up to 23.5 years (Map 2.1). Therefore, where a person lives correlates to the life expectancy due to social, economic, and environmental factors.

Map 2.1 Life Expectancy by Census Tracts in Harris County, 2010-2015



Section 3: Mortality *2016*-**2020**

3.1 Methodology

Data presented throughout this report shows death count, crude mortality rate, or age-adjusted mortality rate. Crude rates are simple rates (e.g., deaths/population at risk over a given period). Age-adjusted or age-standardized rates are adjusted based on the age groups within a population. This technique allows for mortality comparison by race/ethnicity, sex, time, causes, and geographic areas because mortality rates are strongly influenced by the age distribution in a population. An older population will naturally have a higher mortality rate than a younger population.

3.2 Yearly All-Cause Mortality

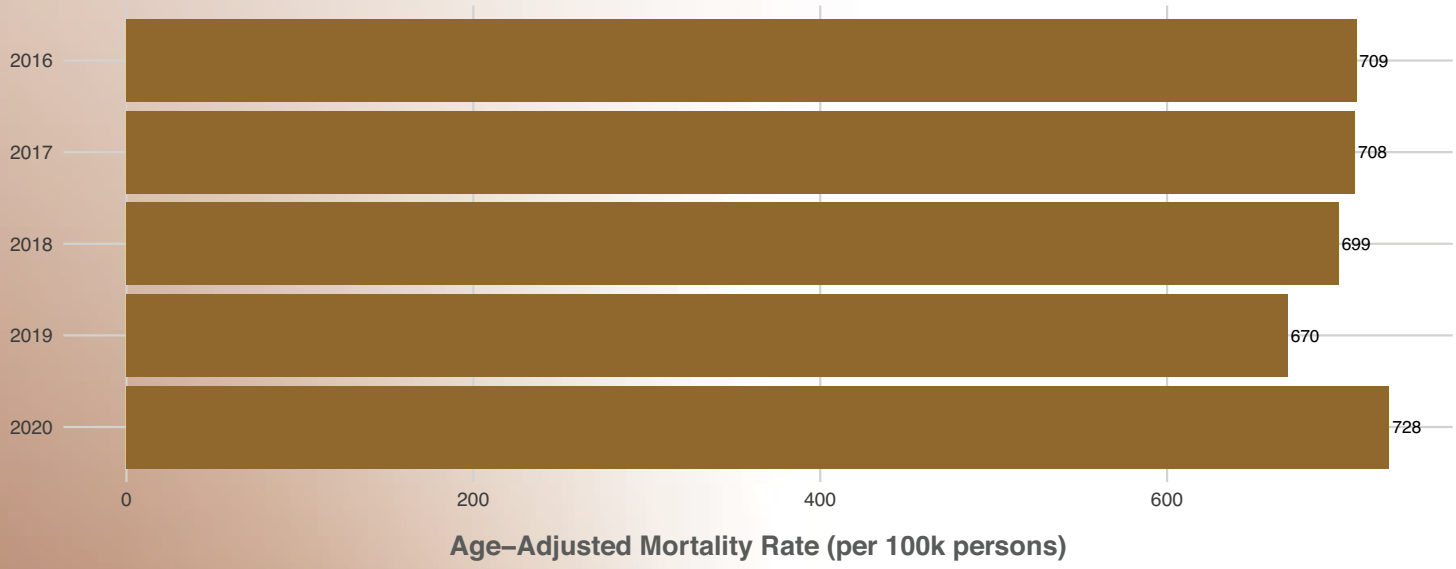
There were 138,924 total deaths between 2016 and 2020 in Harris County for an age-adjusted all-cause mortality rate of 721 per 100,000 persons. Residents 18 years of age or older accounted for 97.7% of the total number of deaths. The death count was stable between 2016 and 2019 and increased by 22.8% in 2020 compared to 2019. Likewise, Table 3.1 shows that the annual all-cause age-adjusted mortality rates had been stable between 2016 and 2018 and reduced in 2019. However, the age-adjusted mortality rate increased by 21.9% in 2020 compared to 2019. In the United States, the death count increased by 17.7% and the mortality rate increased by 15.9% in 2020 compared to 2019. Therefore, Harris County experienced a greater increase in death count and mortality rate than the U.S. in 2020.

Table 3.1 Yearly All-Cause Crude (Unadjusted) and Age-Adjusted Mortality Rates in Harris County, 2016-2020

Year	Total Death	Population	Crude Mortality Rate (per 100k persons)	Age-Adjusted Mortality Rate (per 100k persons)
2016	25,889	4,623,960	560	709
2017	26,663	4,657,972	572	708
2018	26,966	4,680,045	576	699
2019	26,665	4,713,325	566	670
2020	32,741	4,713,325	695	817

The figure below shows that when 3,626 deaths due to COVID-19 were not considered, an increase in the mortality rate by 8.66% in 2020 is still observed. Therefore, both COVID-19 and non-COVID-19 causes contributed to the increase in the mortality rate in 2020.

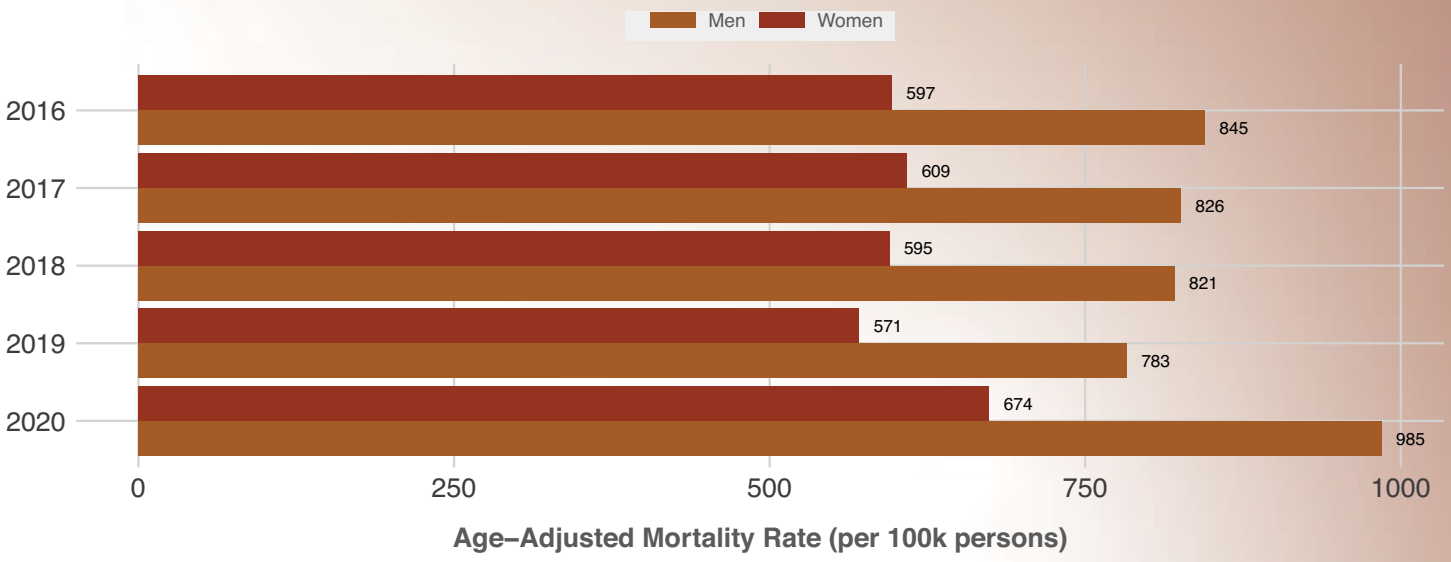
Figure 3.1 Yearly Non-COVID-Cause Age-Adjusted Mortality Rates in Harris County, 2016-2020



Age: There was no drastic difference in the age distribution of death between 2016 and 2020. The proportion of death among those who were younger than 20 years of age have decreased in the past five years through 2020. Correspondingly, the proportion of death in those 20-59 years old were slightly higher in 2020 compared to 2019 (23.7% vs. 22.3%).

Sex: Men consistently had a higher mortality rate than women. The mortality rates remained stable between 2016 and 2019 for both men and women. However, the mortality rates substantially increased in both men (by 25.8%) and women (by 18%) in 2020 compared to 2019 (Figure 3.2).

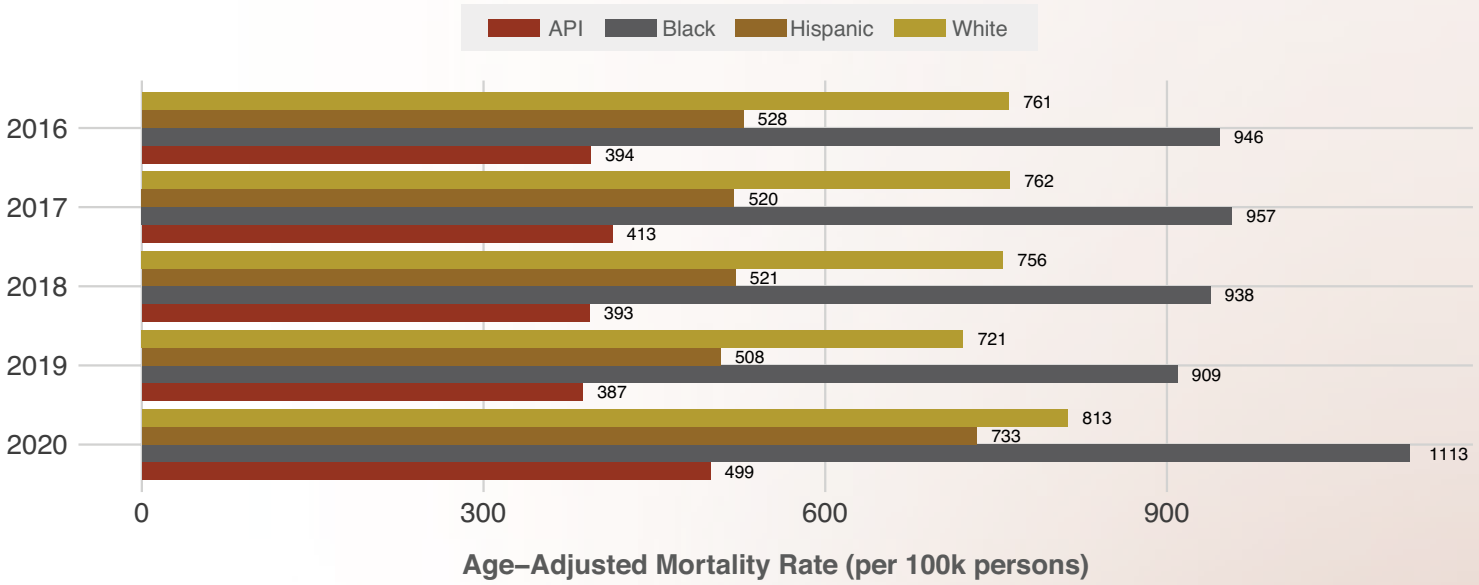
Figure 3.2 Yearly All-Cause Age-Adjusted Mortality Rates by Sex in Harris County, 2016-2020



Race/Ethnicity: Between 2016 and 2019, although the population size had grown in Harris County, the death counts for all racial/ethnic groups remained stable for APIs, Blacks, and Whites. The death counts for Hispanics increased slightly (less than 5%) each year. However, the increase in death count was seen for all racial/ethnic groups in 2020. Compared to 2019, the death count increased by 45.7% for Hispanics, 28.8% for APIs, 22.6% for Blacks, and 12.4% for Whites in 2020.

Figure 3.3 shows the age-adjusted mortality rates for each racial/ethnic group between 2016 and 2020. Blacks had the highest yearly mortality rates, whereas APIs had the lowest yearly mortality rate throughout these years. Similar to the death count, the mortality rate remained stable for all racial/ethnic groups between 2016 and 2019. However, the mortality rate increased for all races, specifically, increasing by 44.3% for Hispanics, 28.9% for APIs, 22.4% for Blacks, and 12.8% for Whites in 2020 compared to the mortality rate of 2019.

Figure 3.3 Yearly All-Cause Age-Adjusted Mortality Rates by Race/Ethnicity in Harris County, 2016-2020



3.3 Yearly Infant Mortality

A total of 3,239 children aged 0-17 years died between 2016 and 2020 in Harris County, which includes 2,037 infant deaths (12 months or younger, 62.9% of the total). The infant death count has dropped from 438 per year to 371 per year, from 2016 to 2020. Figure 3.4 shows that the crude mortality rate for infants varied from 534 to 618 per 100,000 persons and showed a downward trend in Harris County for these five years. In addition, the infant mortality per 1000 live births was 6.32 in 2017, and dropped to 6.01 in 2018, 5.92 in 2019, and 5.82 in 2020.

Figure 3.4 Yearly Infant Mortality Rates in Harris County, 2016-2020

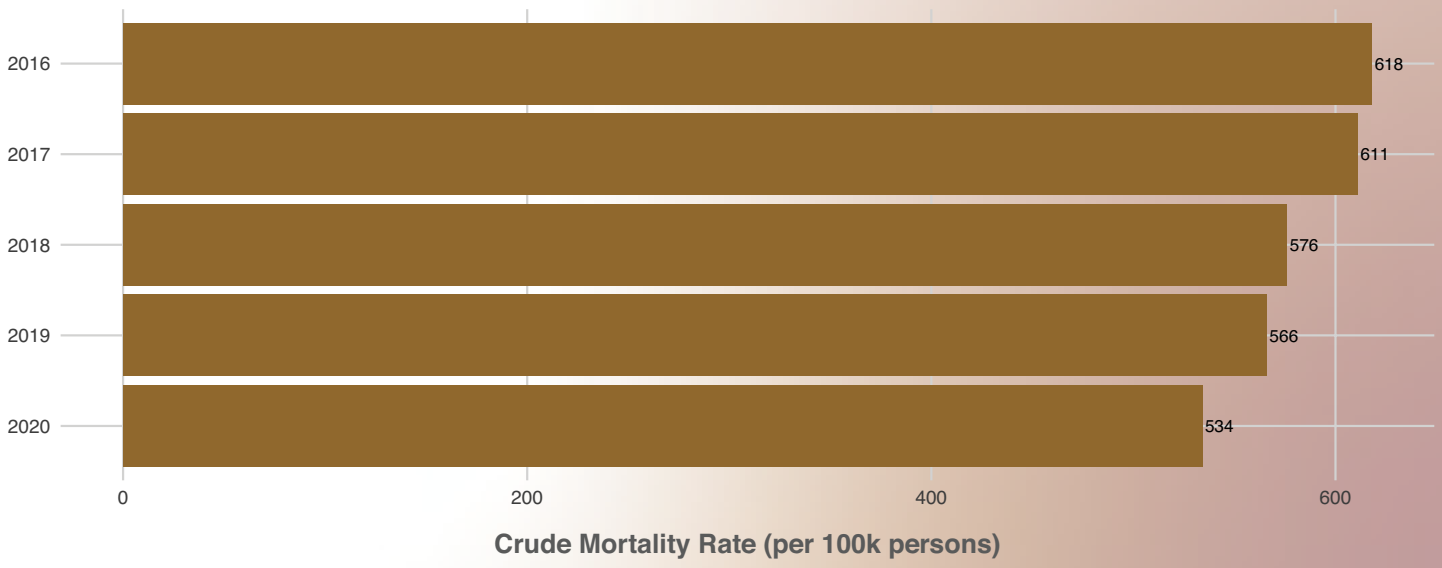


Figure 3.5 shows infant mortality rates were slightly different between male and female infants in each year between 2016 and 2020. The infant mortality rate in female dropped, while the infant mortality in male rose in 2020, compared to 2019.

Figure 3.5 Yearly Infant Mortality Rates by Sex in Harris County, 2016-2020

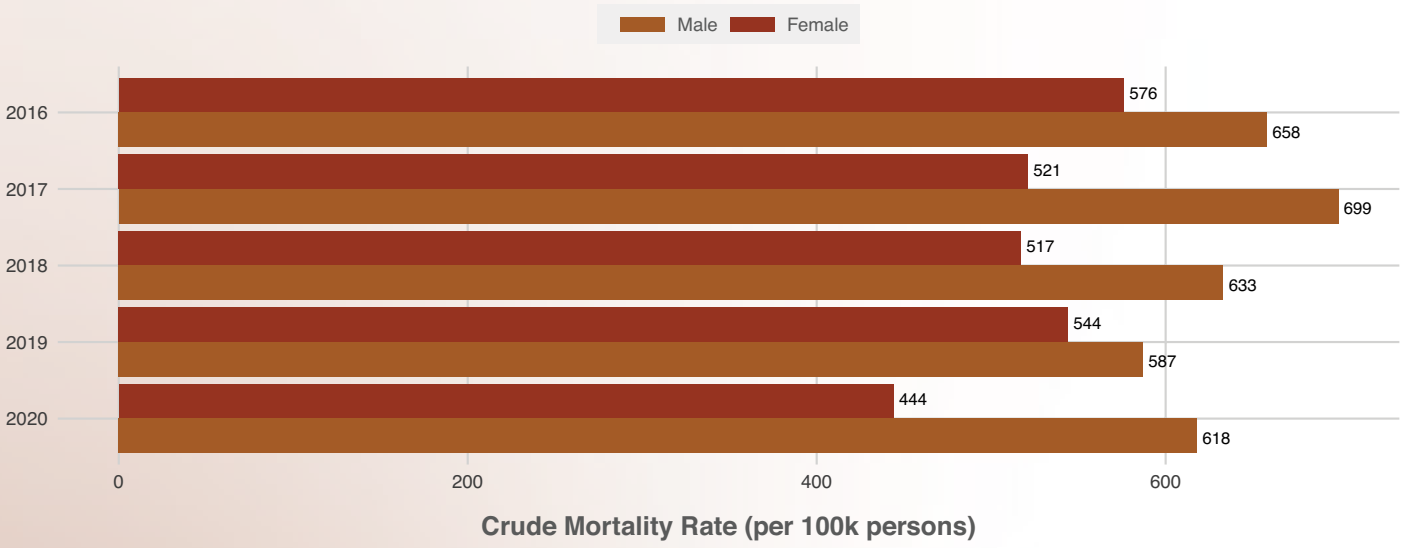
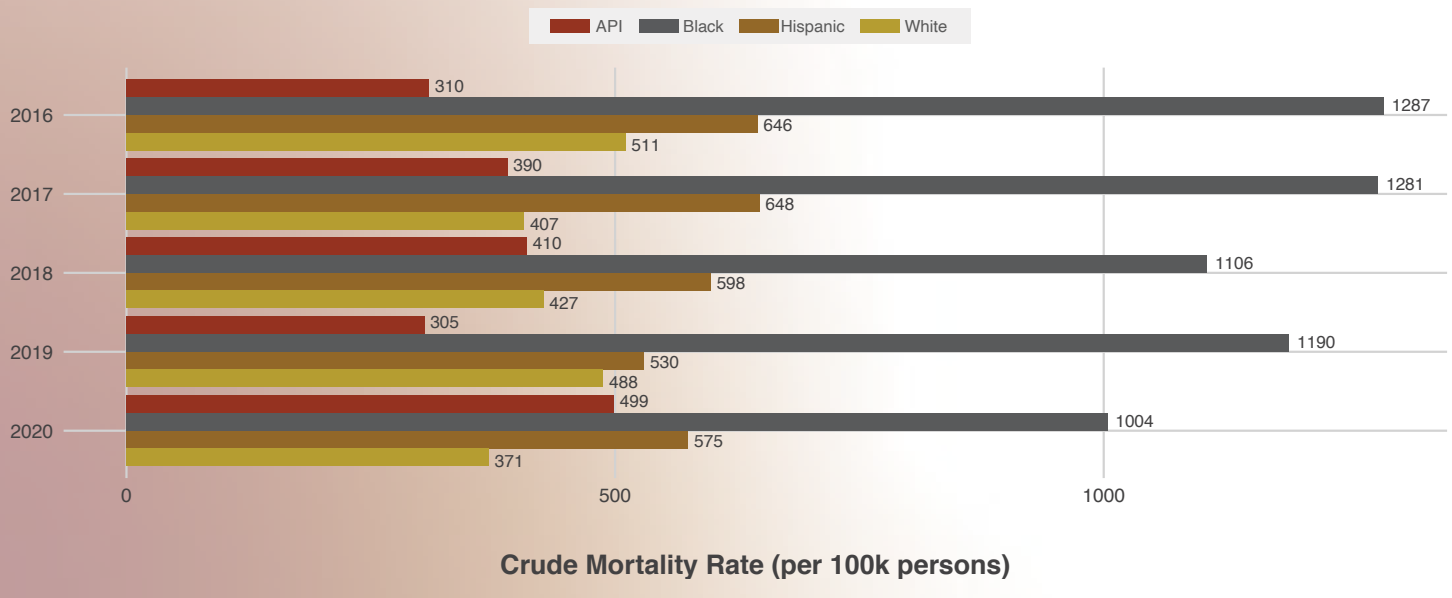


Figure 3.6 shows that the infant mortality rates of Hispanics and Blacks were lower in 2018, 2019, and 2020 than in 2016 and 2017. The infant mortality rate of Whites showed no major change, but was lowest in 2020. The API infant mortality rate increased each year since 2016 except for 2019.

Figure 3.6 Yearly Infant Mortality Rates by Race/Ethnicity in Harris County, 2016-2020



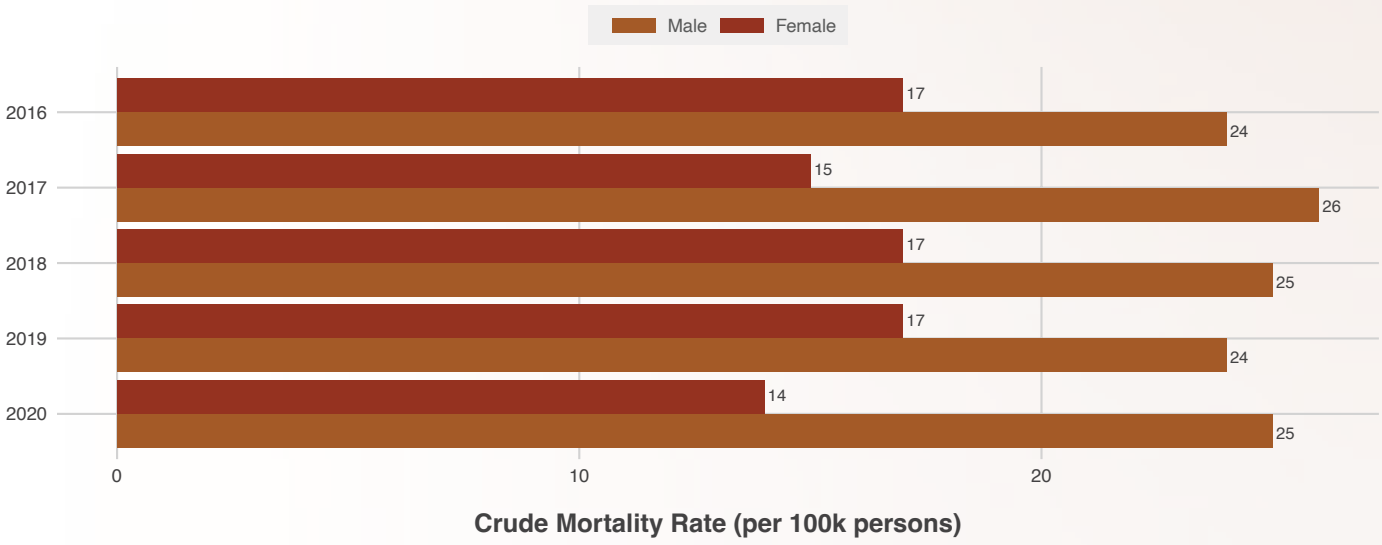
3.4 Yearly Child Mortality

The death count in children aged 1-17 years ranged from 242 to 246 between 2016 and 2019 and dropped to 227 in 2020. Figure 3.5 shows that the crude child mortality rate varied from 19.5 to 21.1 per 100,000 persons between 2016 and 2020 and have been stable.

Figure 3.7 Yearly Child (1-17) Mortality Rates in Harris County, 2016-2020

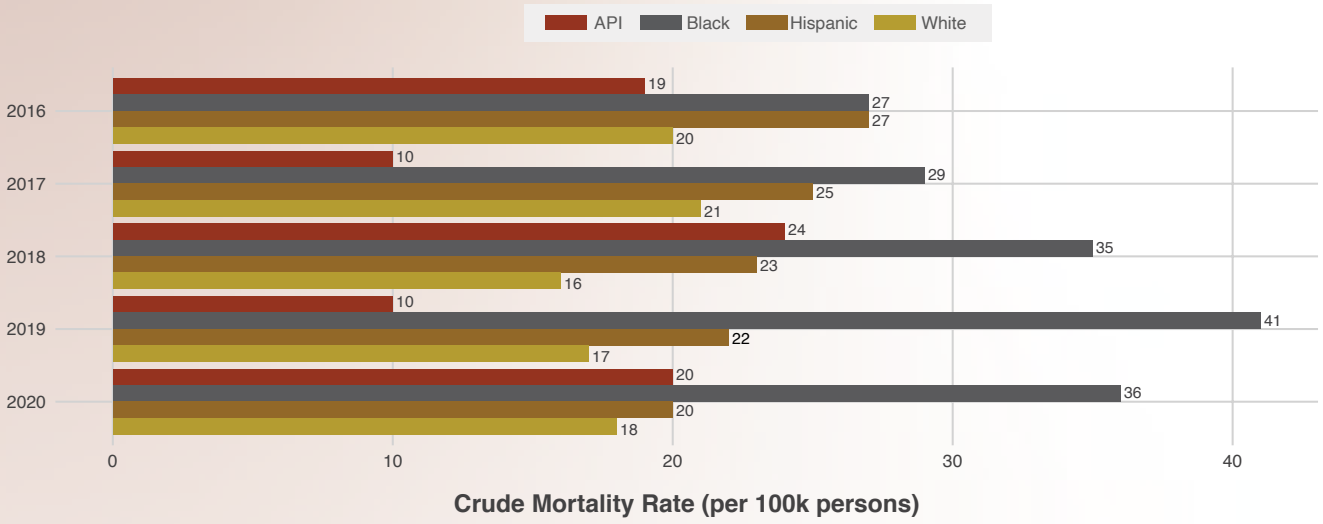
Figure 3.8 shows that male children consistently had higher mortality rate than female children. The mortality rate for male children has been stable in the past five years. The mortality rate of female children reduced in 2010 compared to 2019.

Figure 3.8 Yearly Child Mortality Rates by Sex in Harris County, 2016-2020



Although the overall child mortality rate has been stable, there were differences by race between 2016 and 2020. Figure 3.9 shows that the child mortality rate has decreased in Hispanics since 2016. However, in Blacks, the child mortality rate was higher in 2018, 2019, and 2020 than in 2016 and 2017. Whites had a relatively stable child mortality rate than APIs during these five years.

Figure 3.9 Yearly Child Mortality Rates by Race/Ethnicity in Harris County, 2016-2020



In summary, the infant and child mortality rates were the lowest in 2020. There were also disparities by sex and race for infant and child mortality during these years. It is noted that the number of live births reduced from 2017 to 2020 and the largest drop was seen in 2020.

3.5 Five-Year All-Cause Mortality

Age and Sex: As expected, the mortality rate increased with age. People 80 years or older had the highest mortality rate. Death among people under 40 years of age accounted for 8.69% of the total deaths. Figure 3.10 shows that men's mortality rates were higher than women's mortality rate (per 100,000 persons) for all five years on average (852 vs. 610).

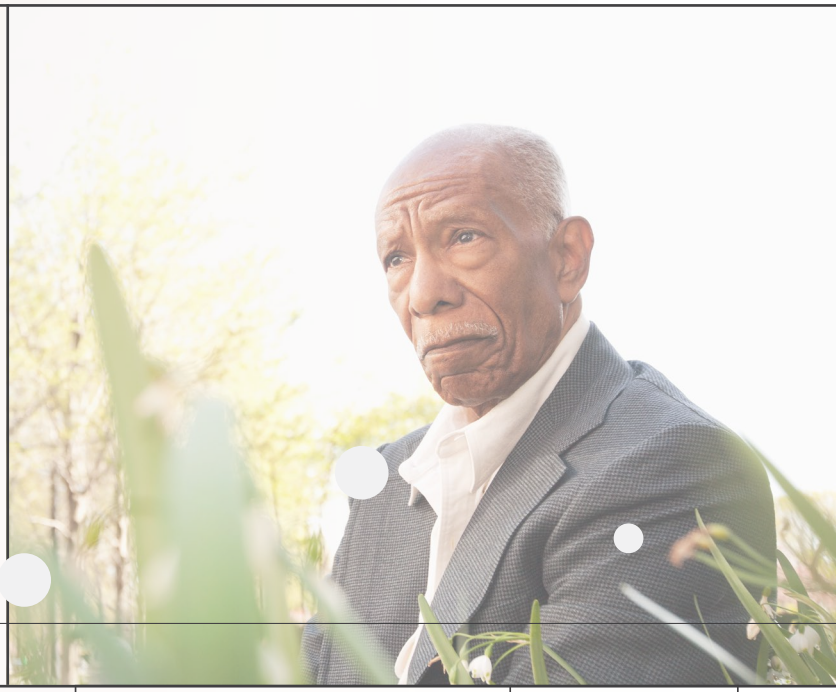
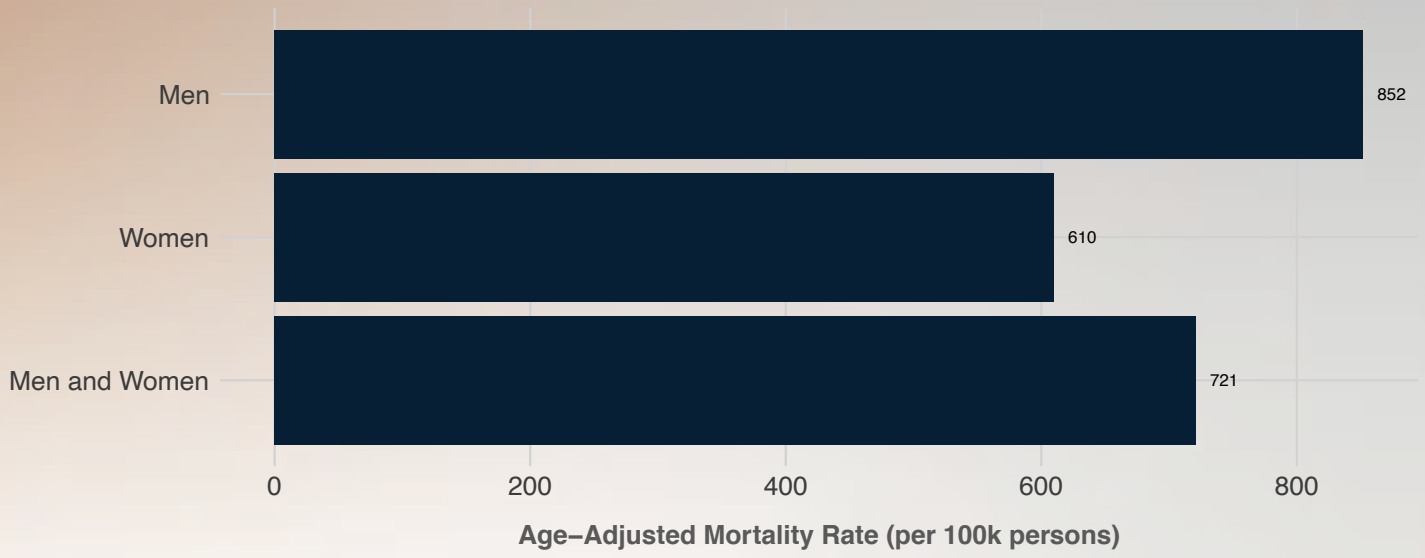
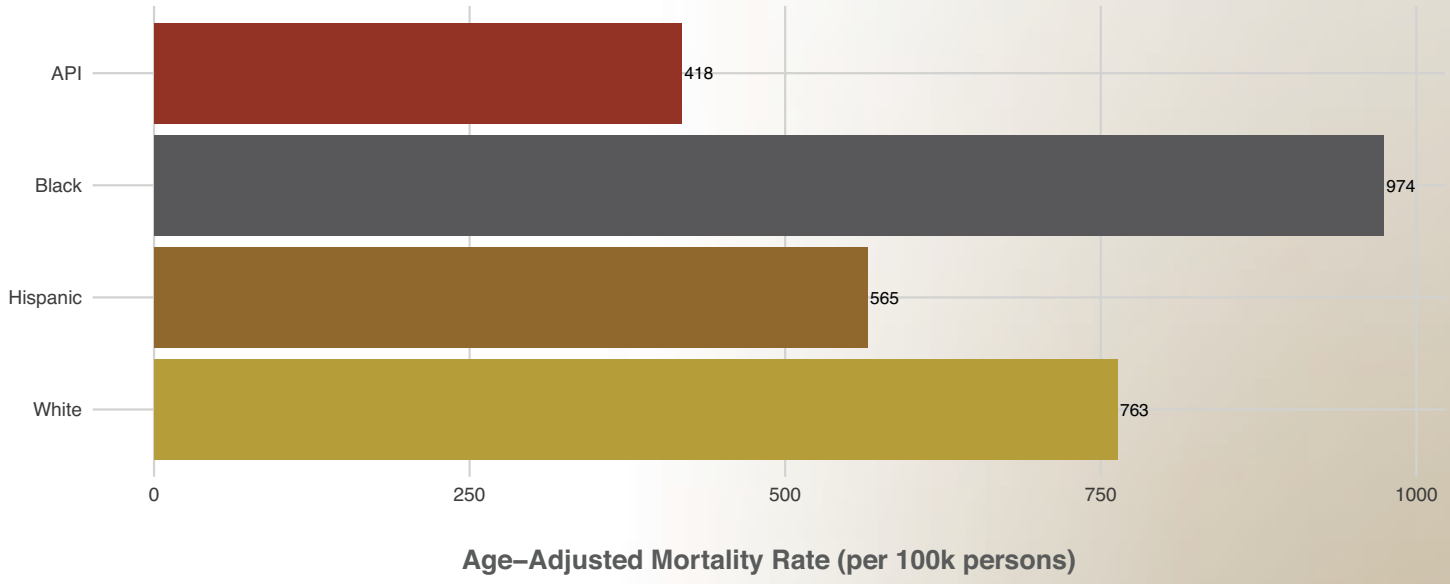


Figure 3.10 All-Cause Age-Adjusted Mortality Rates by Sex in Harris County, 2016-2020



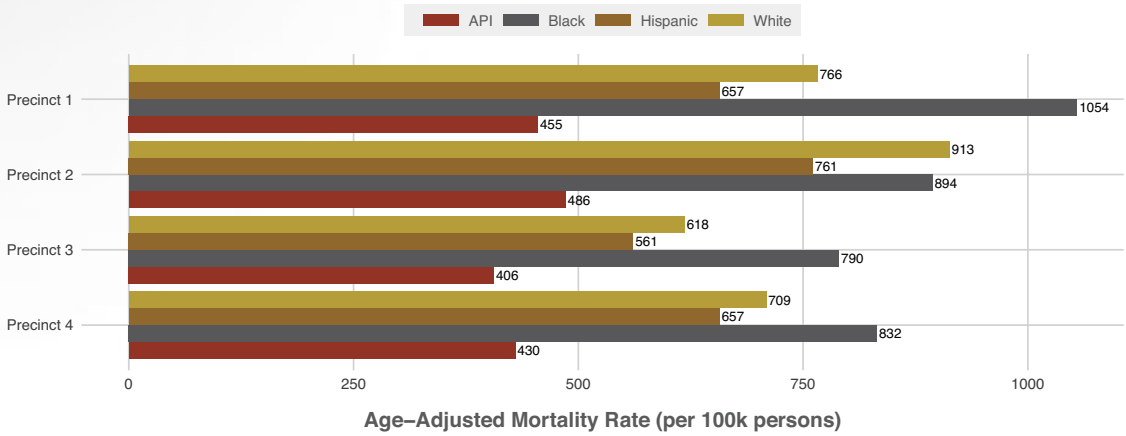
Race/Ethnicity: Figure 3.11 shows that the mortality rate differed by racial groups. Blacks had the highest mortality rate (974 per 100,000 persons), followed by Whites and Hispanics. APIs had the lowest mortality rate. Furthermore, Blacks had the highest mortality in all age groups below 80 years of age. Whites had the highest mortality rate among the oldest residents.

Figure 3.11 All-Cause Age-Adjusted Mortality Rates by Race/Ethnicity in Harris County, 2016-2020



Precinct: Figure 3.12 shows that the mortality rate of each racial/ethnic group was different based on where they lived in the County. Black residents who lived in Precinct 1 had the highest age-adjusted mortality rate and API residents who lived in Precinct 3 had the lowest mortality rate. White, Hispanic, and API residents who lived in Precinct 2 had a higher mortality rate than people of the same racial/ethnic background who lived in other Precincts. Residents who lived in Precinct 3 had the lowest mortality rate regardless of their racial/ethnic background.

Figure 3.12 All-Cause Age-Adjusted Mortality Rates by Race/Ethnicity in Four Precincts of Harris County, 2016-2020



3.6 Five-Year Infant and Child Mortality

Overall and by Gender: The five-year mortality rate (per 100,000 persons) was 581 for infants and 20.7 for children aged 1-17 years. Table 3.2 shows that male infants and children had a higher mortality rate than female infants and children in all five years.

Table 3.2 All-Cause Infant and Child Mortality Rates by Gender in Harris County, 2016-2020

Age Group (years)	Total Death	Population	Crude Mortality Rate (per 100k persons)
< 1			
Female	898	172,515	521.0
Male	1,138	177,962	639.0
Male and Female	2,037	350,477	581.0
1-17			
Female	462	2,854,609	16.2
Male	740	2,965,610	25.0
Male and Female	1,202	5,820,219	20.7

Note: There is an additional 1 death with missing gender information
Note: One infant aged 365 days was included in the <1 age group

Race/Ethnicity: The mortality rate (per 1000 live births) was 14.8 for Black infants, 6.51 for Hispanic infants, 5.43 for White infants, and 3.83 for API infants. Figure 3.13 shows that Black infants had more than double the mortality rate of other racial/ethnic groups. A total of 42.5% infant deaths that occurred between 2016 and 2020 were Hispanic and 37.2% were Black. API infants had the lowest mortality rate between 2016 and 2020. It should be noted that between 2017 and 2020, 50.0% of all newborns in Harris County were Hispanic.

Figure 3.13 Infant Mortality Rates by Race/Ethnicity in Harris County, 2016-2020

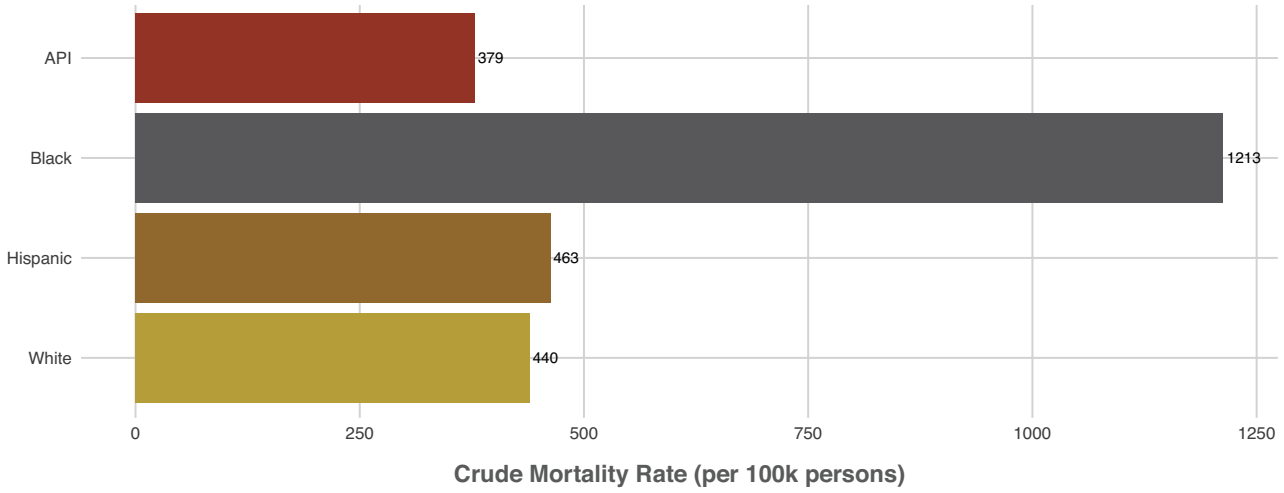
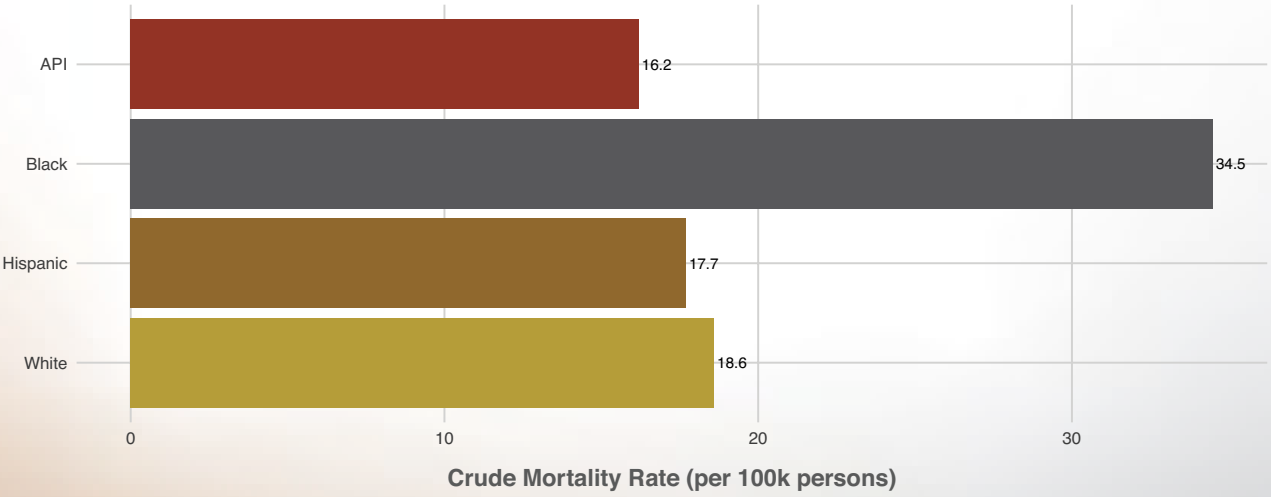


Figure 3.14 shows that Black children aged 1-17 had the highest all-cause mortality rate. A total of 45.6% of deaths in children were Hispanic and 30.4% were Black during these five years. API children followed by White children had the lowest mortality rates between 2016 and 2020.

Figure 3.14 Child Mortality Rates by Race/Ethnicity in Harris County, 2016-2020



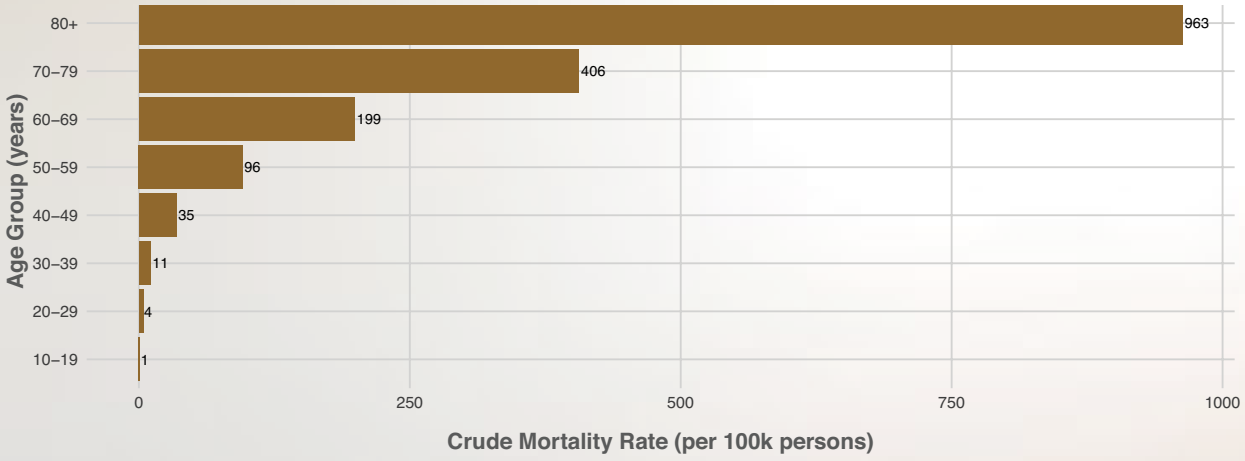
In summary, the mortality rate for younger residents (aged 17 or under) remained stable from 2016 to 2019 and slightly decreased in 2020. Black infants and children had a much higher mortality rate than other racial/ethnic groups. Male infants and children had a higher mortality rate than female infant and children. The COVID-19 pandemic had no impact on children's mortality in 2020.

3.7 2020 COVID-19 Mortality

COVID-19 is the third leading cause of death and the first leading underlying cause of death in Harris County in 2020. In 2020, there were 32,741 all-cause deaths in Harris County in 2020, including 3,626 COVID-19 deaths (11.1% of the total). The overall COVID-19 age-adjusted mortality was 89 per 100,000 persons. Men had a higher age-adjusted mortality rate of COVID-19 than women (122 vs. 63 per 100,000 persons).

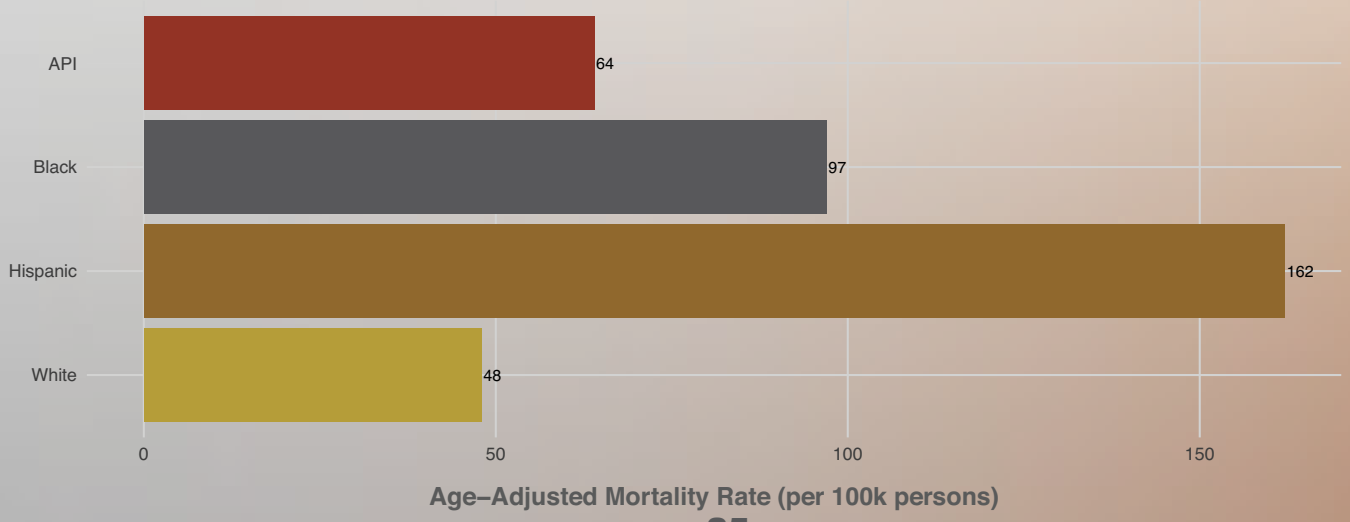
Age: A total of 76.3% COVID-19 deaths occurred among residents aged 60 or older and 28.1% occurred among those aged 80 or older. There was no COVID-19 mortality among young residents aged 0-9. COVID-19 caused five deaths among those who were 10-19 years old, all of whom were Hispanic. Figure 3.15 shows that the COVID-19 mortality rate increased with age.

Figure 3.15 COVID-19 Crude Mortality Rates by Age Groups in Harris County, 2020



Race/Ethnicity: Figure 3.16 shows that Hispanics had the highest COVID-19 age-adjusted mortality rate, followed by Blacks and then APIs. Whites had the lowest COVID-19 mortality rate in Harris County. More than half of the COVID-19 deaths that occurred in Harris County were Hispanic (51.3%) in 2020.

Figure 3.16 COVID-19 Age-Adjusted Mortality Rates by Race/Ethnicity in Harris County, 2020



In addition, Hispanics died younger due to COVID-19 than other racial/ethnic groups. Figure 3.17 shows a higher percentage of Hispanics, who were younger than 60 years old, that passed away due to COVID-19 than other racial/ethnic groups. Because more men than women died of COVID-19, the pandemic is expected to significantly reduce the life expectancy in Hispanics, specifically in Hispanic men in 2020.

Figure 3.17 Age Distribution of COVID-19 Deaths by Race/Ethnicity in Harris County, 2020

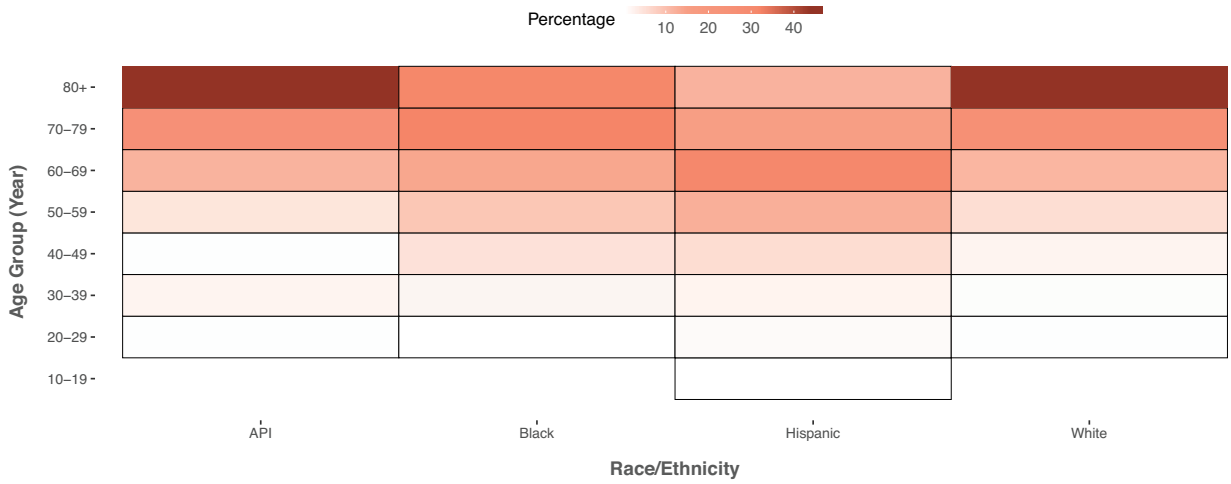
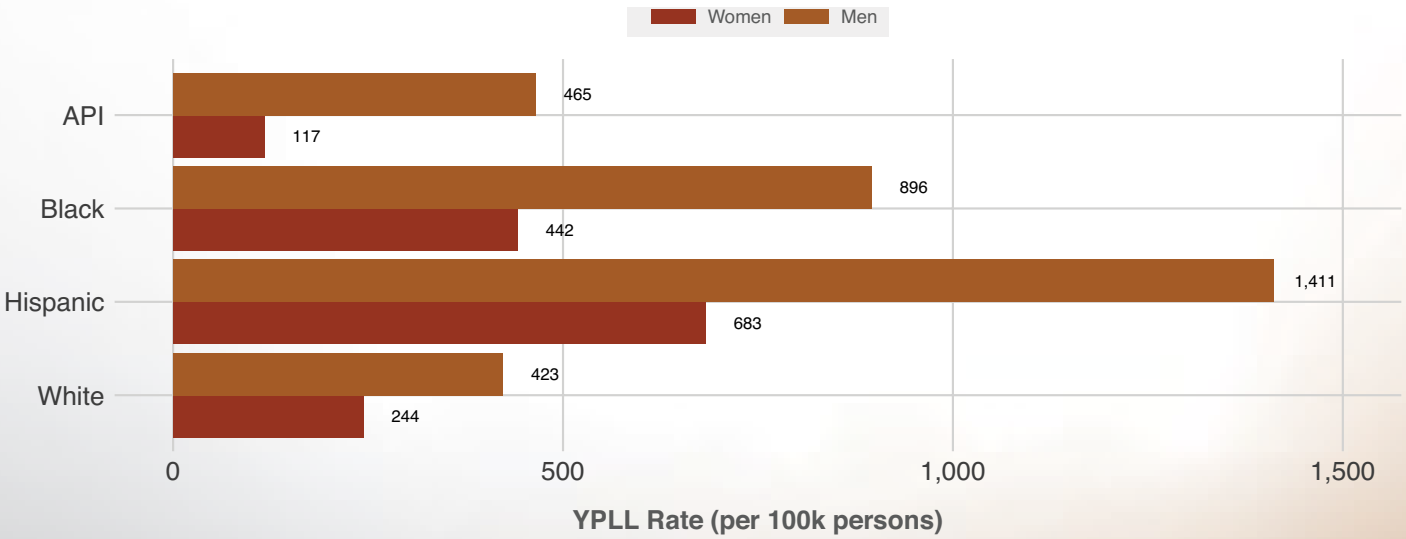
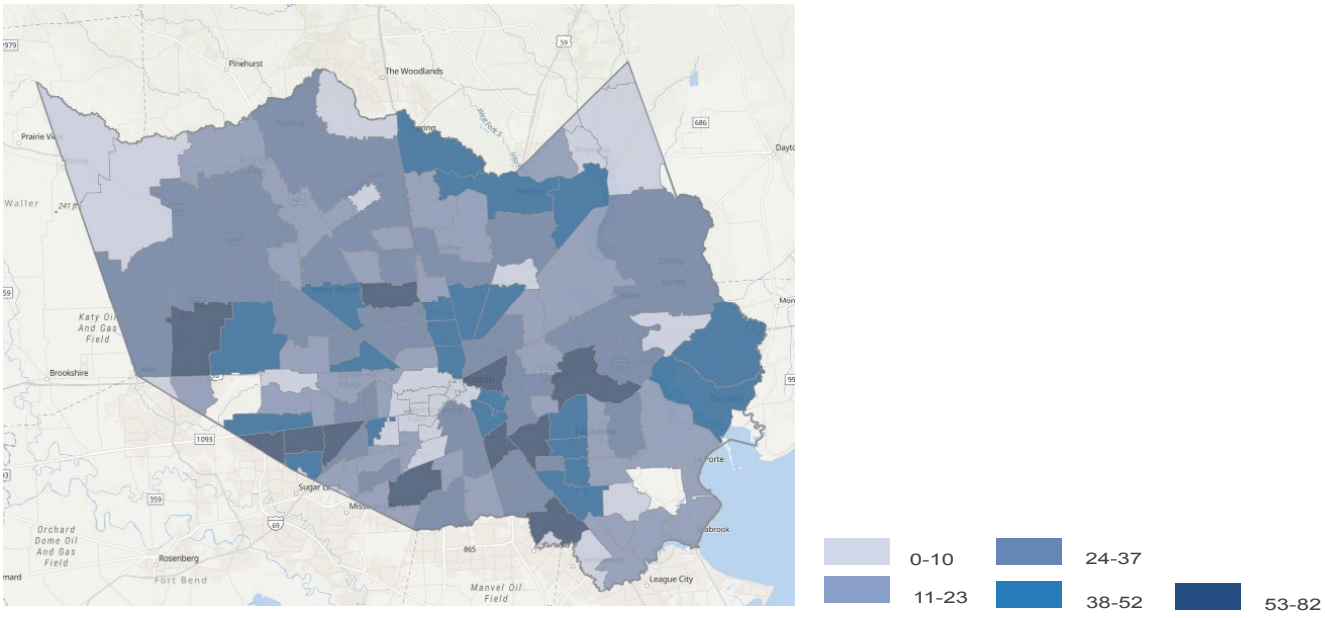


Figure 3.18 shows that the rate of years of potential life lost (YPLL), or death before 75 years old, was the highest for Hispanic men due to COVID-19 in 2020.

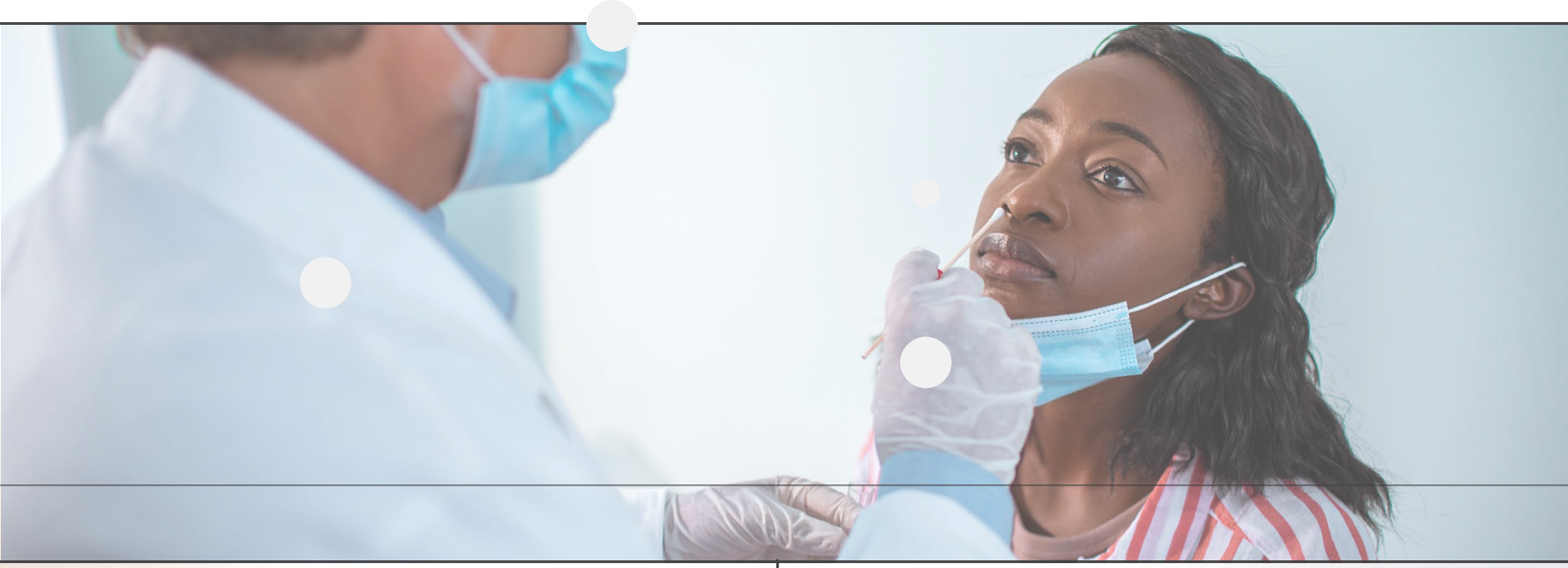
Figure 3.18 COVID-19 Years of Potential Life Lost Rates by Race/Ethnicity and Sex in Harris County, 2020



Map 3.1 COVID-19 Death by Zip Code in Harris County, 2020



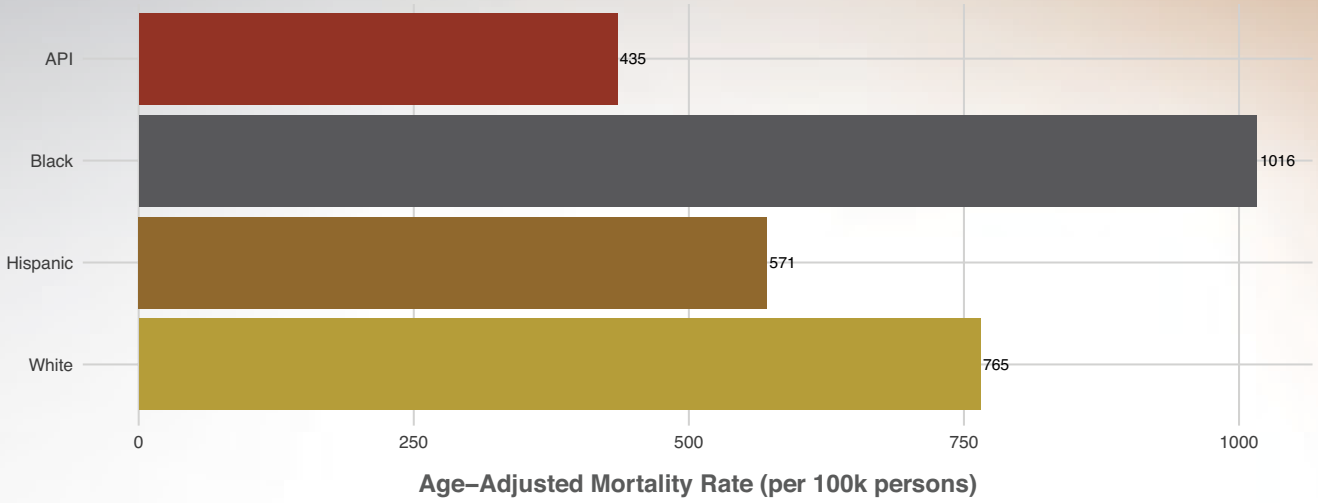
Map 3.1 shows the geographic disparity of the COVID-19 death in Harris County in 2020.



3.8 2020 Non-COVID-19 Mortality

There were 29,115 non-COVID-19 deaths in Harris County in 2020, which was an increase of 9.19% compared to 2019. The death count increased by 13.1% for Hispanics, 12.7% for APIs, 12.5% for Blacks, and 5.62% for Whites. The non-COVID-19 age-adjusted mortality rate in 2020 was 728 per 100,000 persons, an 8.66% increase compared to the rate in 2019. Figure 3.19 shows that Blacks had the highest age adjusted non-COVID mortality rate during the pandemic year as in the past years. However, the magnitude of increase in non-COVID-19 mortality rate was highest for Hispanics and APIs (12.4%), followed by Blacks (by 11.8%), and Whites (by 6.10%). Therefore, among all the races/ethnicities, Hispanics not only had the highest COVID-19 mortality rate, but also had the greatest increase in all-cause age-adjusted mortality rate (by 44.3%), and non-COVID-19 age-adjusted mortality rate (by 12.4%) in 2020 compared to 2019.

Figure 3.19 Non-COVID-19 Age-Adjusted Mortality Rates by Race/Ethnicity in Harris County, 2020



Month: Figure 3.20 shows the all-cause death count in each calendar month between 2016 and 2020. The darker the color, the higher the death count. In 2020, the death counts were equivalent to those occurred in January and February of the previous years except for January of 2018. However, the death counts were higher in the remainder months than those in the previous years since the pandemic started in March 2020. The greatest increase was seen in July and August when COVID-19 deaths peaked. Half of the COVID-19 deaths occurred in July and August of 2020. Months of July, August, and December of 2020 were the three deadliest months in Harris County between 2016 and 2020.

Figure 3.20 All-Cause Death by Calendar Months in Harris County, 2016-2020

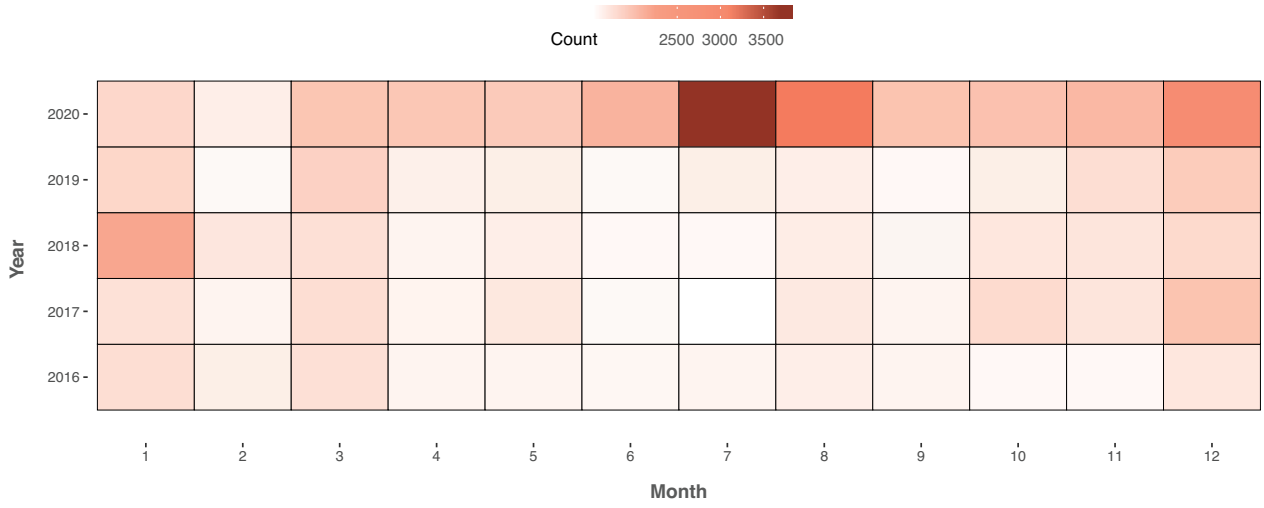
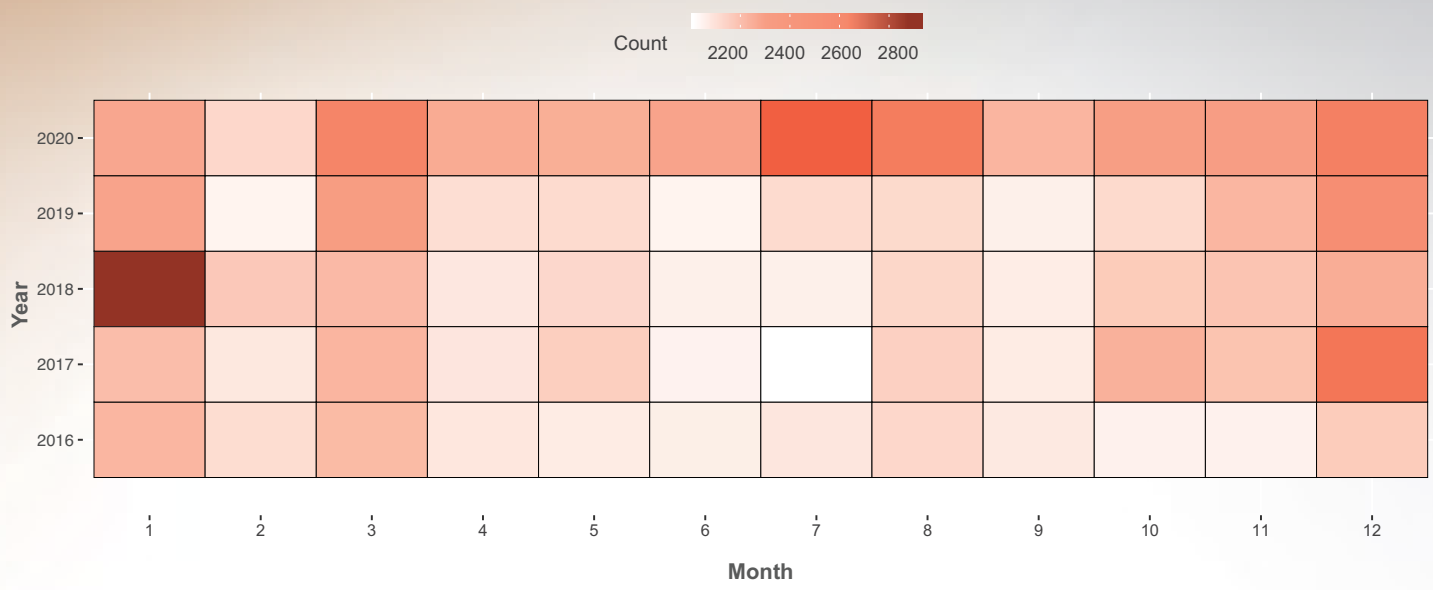


Figure 3.21 shows the non-COVID-19 death count in each month between 2016 and 2020. There were more deaths due to non-COVID-19 causes between April and November of 2020 than the same months of the previous years. The highest number of deaths occurred in the months when COVID-19 deaths peaked. There were excessive deaths in December of 2017 and January of 2018 as well.

Figure 3.21 Non-COVID-Cause Death by Calendar Months in Harris County, 2016-2020



In summary, in 2020, deaths due to COVID-19 (n = 3,626) were almost triple the deaths due to atherosclerotic heart disease (n = 1,334), which has been the first leading underlying cause of non-COVID-19 death. COVID-19 claimed lives of the elderly more than youth, men more than women, and Hispanics more than any other racial/ethnic groups. Non-COVID-19 deaths also increased in 2020 across all racial/ethnic groups. Whites had minimal impact from the COVID-19 pandemic in terms of loss of life. The non-COVID-19 deaths were coincident with the COVID-19 deaths. Non-COVID-19 death may be directly or indirectly related to the COVID-19. Spatial analysis should be performed to determine the geographic proximity of COVID-19 vs. non-COVID-19 deaths.

Section 4: Leading *Causes of* **Death**

4.1 Leading Causes of Death in 2016-2020

From 2016 to 2020, there were 1,994 unique ICD-10 codes as the underlying causes of death, including 460 underlying causes that each caused more than 19 deaths during these five years. Figure 4.1 shows ten leading causes of death that accounted for 71.6% of the total deaths during this time. Chronic diseases continue to be the major causes of death in Harris County. Heart disease and cancer accounted for 41.9% of the total deaths. Adding accident, these three leading causes accounted for 48.3% of the total deaths during these five years. The top six leading causes of death remained the same between 2016 and 2019, while the other leading causes of death changed in rank slightly. COVID-19, which began in March 2020 in Harris County, was the ninth leading cause of death in all five years.

Figure 4.1 Ten Leading Causes of Death by Total Count in Harris County, 2016-2020

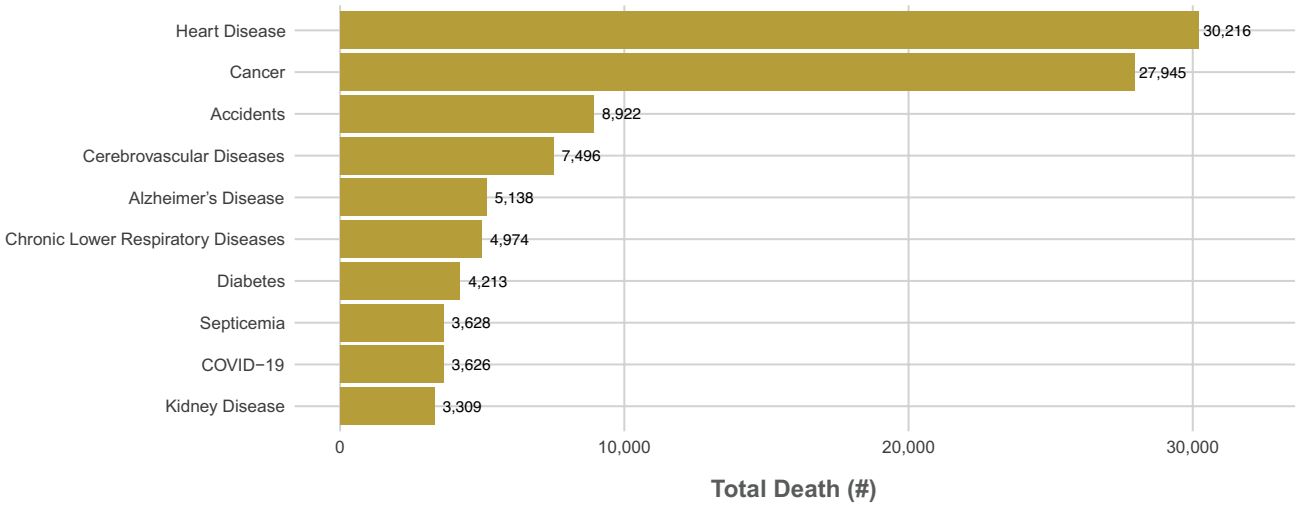
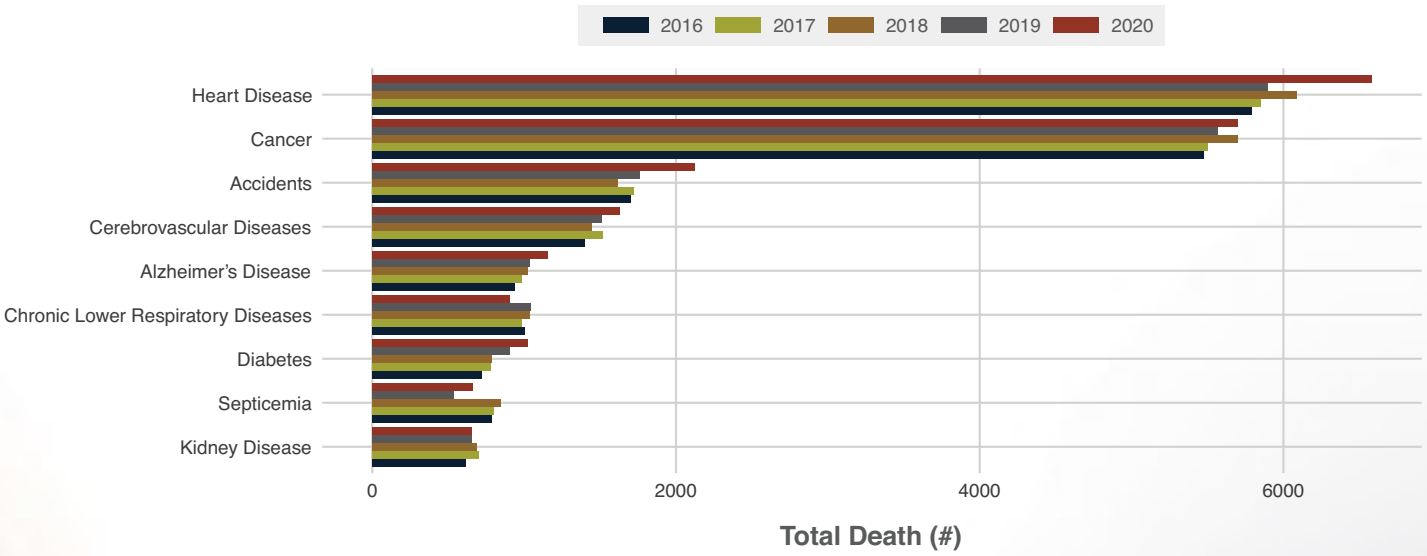


Figure 4.2 shows the death count trend of the nine leading causes of death (excluding COVID-19) between 2016 and 2020.

Figure 4.2 Yearly Death Count of Leading Causes of Death in Harris County, 2016-2020



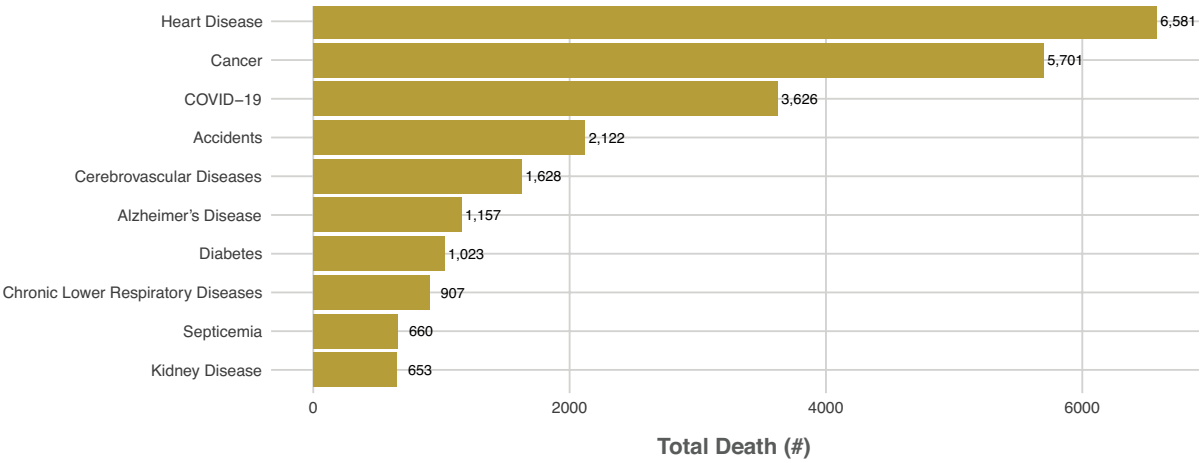
The death counts for most of the leading causes remained stable between 2016 and 2019. However, the death due to diabetes increased by 15.0% in 2019 compared to 2018. The death due to septicemia dropped by 36.3% in 2019 compared to 2018. Where in 2020, the death count increased by 11.5% for heart disease, 20.5% for accidents, 11.9% for Alzheimer's disease, 13.2% for diabetes, and 22.9% for septicemia, compared to 2019. In 2020, the death due to chronic lower respiratory disease[5] decreased by 12.9% in 2020. Similar to Harris County, in the U.S, an increase in death count is observed for heart disease (by 4.8%), accidents (by 11.1%), Alzheimer's disease (by 9.8%), diabetes (by 15.4%), and influenza and pneumonia (by 7.5%) in 2020 compared to 2019. Deaths due to chronic lower respiratory disease dropped by 3.4%.

Leading Causes of Death in 2020

Figure 4.3 shows that COVID-19 was the third leading cause of death in 2020, same as the national report. The rank of other leading causes remains consistent. Chronic liver disease and cirrhosis were the tenth leading cause of death from 2016 to 2018, and in 2020 (excluding COVID-19). The rank of chronic lower respiratory diseases dropped in 2020.

The leading causes of death in Harris County in 2020 largely align with those identified throughout the nation. The top 11 leading causes of death in the U.S. in 2020 are heart disease, cancer, COVID-19, accidents, stroke, chronic lower respiratory diseases, Alzheimer's disease, diabetes, influenza and pneumonia, kidney disease, and suicide. Compared to its rank in the nation, septicemia ranks higher as a leading cause of death in Harris County.

Figure 4.3 Ten Leading Causes of Death by Total Count in Harris County, 2020

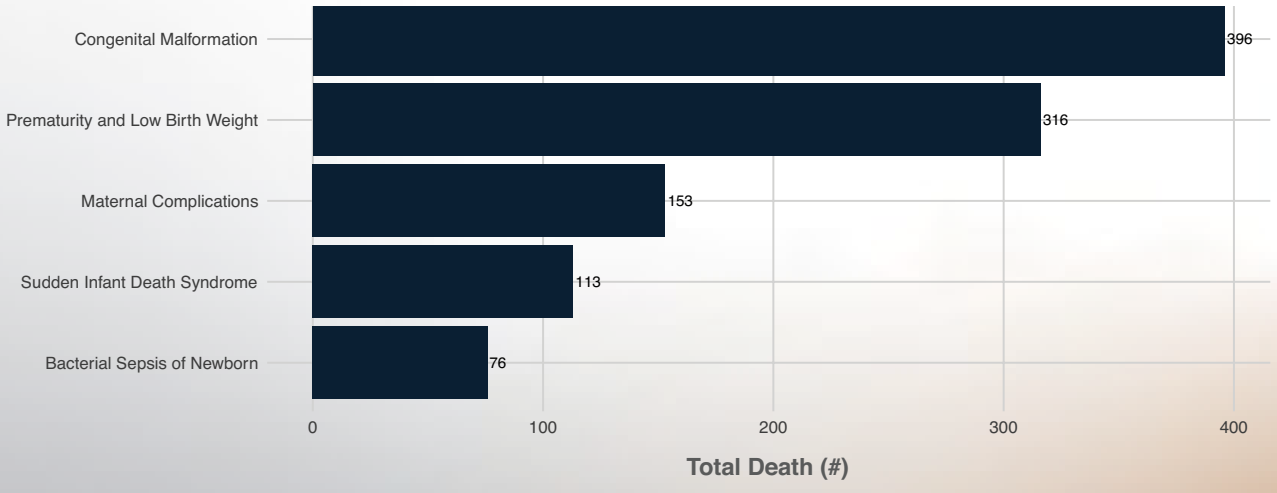


4.2 Leading Causes of Death by Age

Infant

Among the 2,037 infant deaths, the leading causes of death, as seen in Figure 4.4, were congenital malformation, prematurity and low birth weight, maternal complications, SIDS, and bacterial sepsis. Each cause accounted for less than 100 deaths yearly. These five causes accounted for 51.7% of the total infant death between 2016 and 2020.

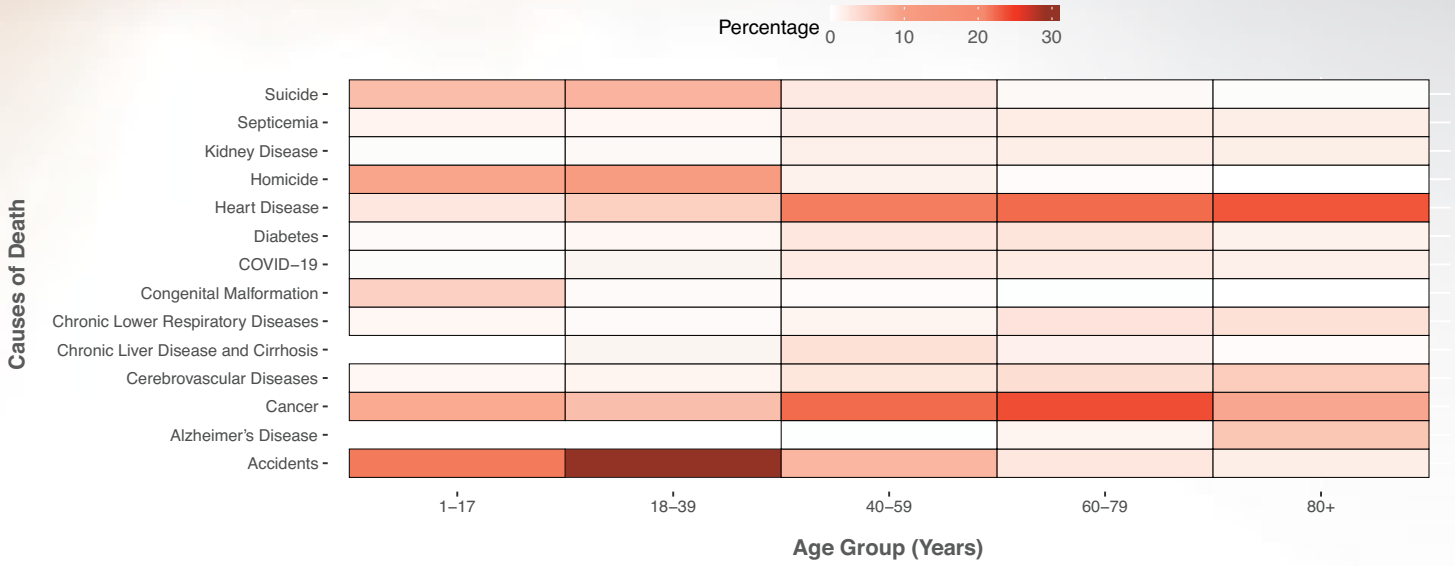
Figure 4.4 Five Leading Causes of Infant Death by Total Count in Harris County, 2016-2020



[5] Chronic Lower Respiratory Disease refers to chronic respiratory (breathing) diseases: Asthma, Bronchitis, Emphysema and other lower respiratory diseases. People with these irreversible chronic diseases all experience shortness of breath caused by an airway blockage.

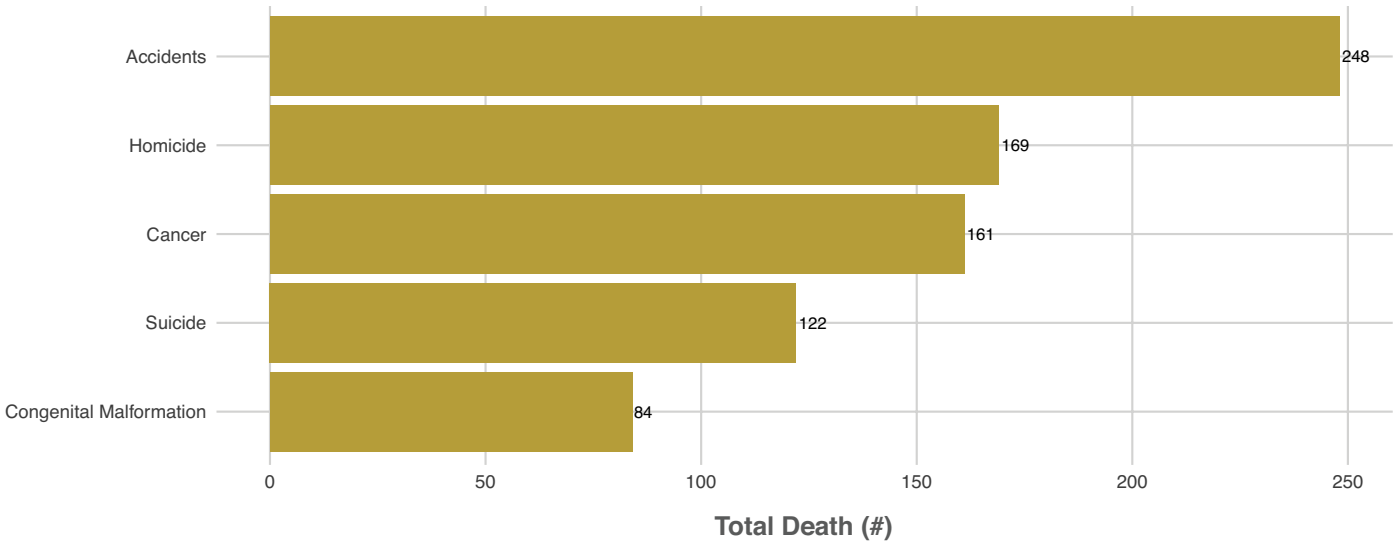
Leading Causes of Death of Residents (Age 12 months and older)
Figure 4.5 shows that the leading causes of death vary with age, not including infants, between 2016 and 2020.

Figure 4.5 Mortality Percentage of Leading Causes of Death by Age Groups in Harris County, 2016-2020



For 1,202 children (1-17 years of age) who died between 2016 and 2020, accidents, homicide, cancer, suicide, and congenital malformation were the five leading causes of death which accounted for 65.2% of the total deaths as shown by Figure 4.6 below. None of these leading causes resulted in more than 60 deaths in each year. From 2018 to 2020, homicide surpassed cancer and suicide becoming the second leading cause of death for children aged 1-17.

Figure 4.6 Leading Causes of Child Death by Total Count in Harris County, 2016-2020



Among those 18 to 39 years of age, accidents, homicide, suicide, cancer, and heart disease accounted for 75.1% of the total deaths. Accident was the first leading cause of death. Heart disease was the fifth leading cause of death in this age group, replacing congenital malformation, which was the fifth leading cause of death in the 1-17 age group. Notably, HIV was the sixth leading cause of death in this age group.

Among those 40-59 years of age, cancer and heart disease become the leading causes of death. Cancer, heart disease, accidents, chronic liver disease and cirrhosis, and cerebrovascular disease accounted for 62.3% of the total deaths in this age group.

Among those 60-79 years of age, cancer, heart disease, cerebrovascular diseases, chronic lower respiratory diseases, and diabetes accounted for 62.7% of the total deaths. Diabetes replaces accidents as one of the five leading causes of death relative to the 40-59 age group.

Among those 80 years of age or older,heart disease, cancer, Alzheimer's disease, cerebrovascular diseases, and chronic lower respiratory disease together accounted for 60.8% of the total deaths. Death due to Alzheimer's disease has increased in the past five years and is the first leading underlying cause of death in older women and the second leading underlying cause of death in older men in Harris County.

In general, among those 40 years of age or younger, accidents, homicide, and suicide made up 56.6% of the total deaths. Among 40 years of age or older, chronic diseases (heart disease, cancer, cerebrovascular diseases, Alzheimer's disease, and chronic lower respiratory diseases) made up 58.2% of total deaths. Alzheimer's disease was not a cause of death for those who were 60 years of age or younger. Homicide and suicide were rarely the cause of death for those who were 60 years of age or older. Cancer affected the lives of all ages, but there was a greater margin in the number of deaths in those aged 60–79 years old. Heart disease was the leading cause of death in the elderly population.

4.3 Leading Causes of Death by Sex

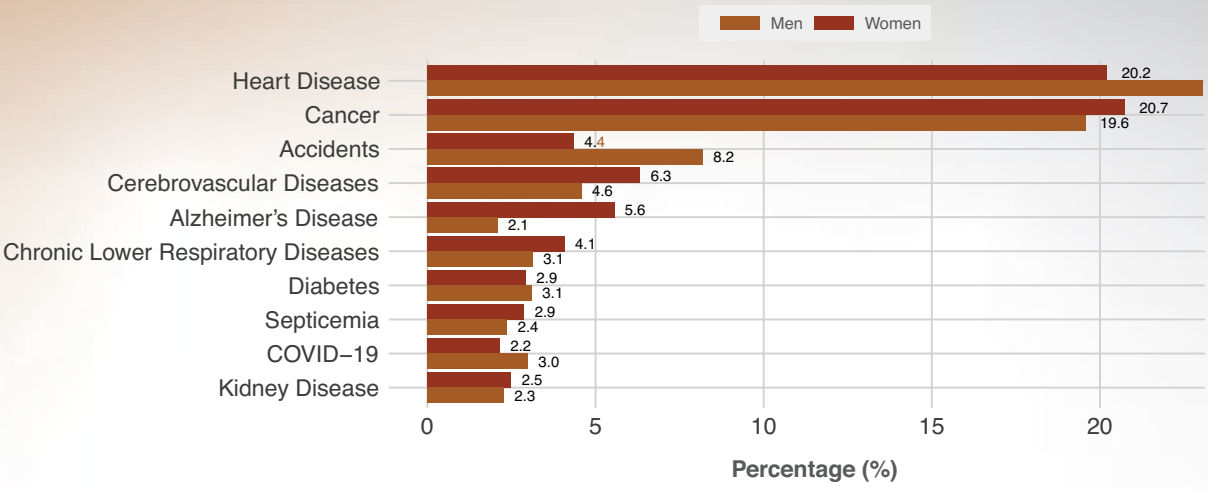
The top ten leading causes of death differ in men and women between 2016 and 2020. Heart disease was the leading cause of death in men, and cancer was the leading cause of death in women. COVID-19, suicide, and homicide were the seventh, eighth, and ninth leading cause of death in men, respectively. Alzheimer's disease, kidney disease, and COVID-19 were the fourth, ninth, and tenth leading causes of death in women, respectively.

Suicide and homicide were not among the top ten leading causes of death for women and Alzheimer's disease and kidney disease were not among the top ten leading causes of death for men. Figure 4.7 shows that a higher proportion of men died of heart disease, accidents, and suicide than women. A higher proportion of women died of Alzheimer's disease, cerebrovascular disease, and chronic lower respiratory diseases than men.

Men had a higher age-adjusted death rate of all the leading causes than women, except for Alzheimer's disease. Young men had more deaths due to suicide, homicide, and accidents than young women. Homicide and unintentional drug overdose were the leading causes of death in men who were 18 to 49 years of age. Homicide and chronic ischemic heart disease were the leading causes of death in men who were 18 to 59 years of age. Breast cancer and unintentional drug overdose were the leading causes of death in women who were 18 to 59 years of age, as well as women 18 to 49 years of age.

"**Heart disease** was the *leading* cause of **death** in men and **cancer** was the *leading* cause of death in women."

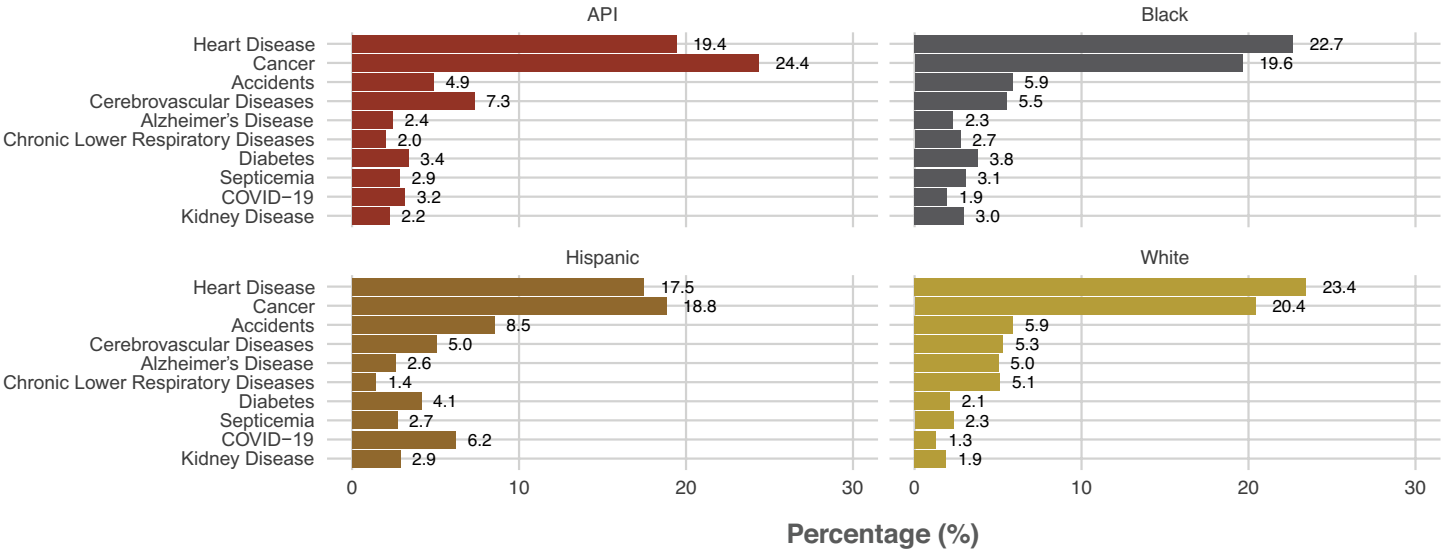
Figure 4.7 Leading Causes of Death Contributing to Total Deaths by Sex in Harris County, 2016-2020



4.4 Leading Causes of Death by Race/Ethnicity

Figure 4.8 shows the leading causes of death by race/ethnicity from 2016 to 2020 in Harris County. Heart disease was the leading cause of death for Whites and Blacks. Cancer was the leading causes of death for Hispanics and APIs. Compared to other racial/ethnic groups, a higher proportion of deaths in Whites were due to heart diseases, chronic lower respiratory diseases, and Alzheimer's disease; a higher proportion of deaths in Blacks were due to septicemia and kidney disease; a higher proportion of deaths in Hispanics were due to accidents, diabetes, and COVID-19; and a higher proportion of deaths in APIs were due to cancer and cerebrovascular disease. COVID-19 was the fourth leading cause of death for Hispanics and sixth leading cause of death for APIs between 2016 and 2020. COVID-19 was not among the top ten leading causes of death for Whites and Blacks between 2016 and 2020. In 2020, COVID-19 was the first leading cause of death for Hispanics, the third leading cause of death for APIs and Blacks, and the fourth leading cause of death for Whites.

Figure 4.8 Leading Causes of Death Contributing to Total Deaths by Race/Ethnicity in Harris County, 2016-2020



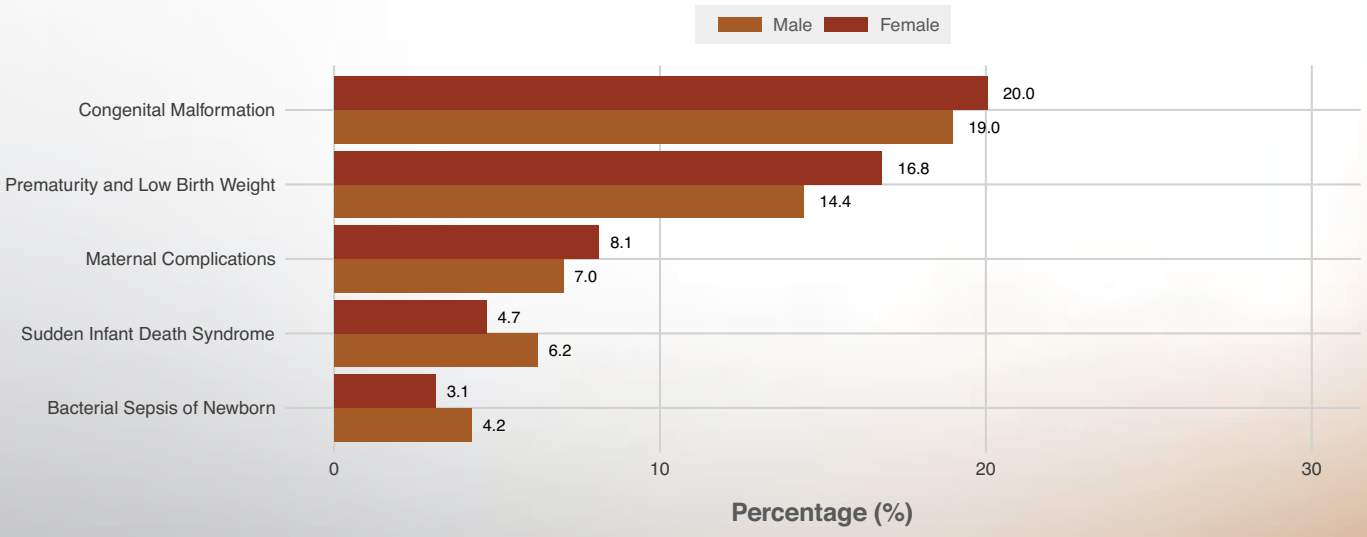
Between 2016 and 2020, while not being ranked in the top ten leading causes of death overall, the racial disparity was observed for homicide and suicide. Homicide was the sixth leading cause of death in Blacks, and suicide was the ninth leading cause of death in Whites and APIs. In fact, Blacks accounted for 53.4% of the deaths due to homicide, whereas Whites accounted for 55.2% of the deaths due to suicide. In addition, chronic liver disease and cirrhosis was the seventh leading cause of death in Hispanic population.

Blacks had the highest age-adjusted mortality rates of heart disease, cancer, diabetes, septicemia, kidney disease, and cerebrovascular diseases. Whites had the highest age-adjusted mortality rate of accidents (such as unintentional drug overdose), chronic lower respiratory diseases, and Alzheimer's disease. Hispanics had the highest mortality rate of COVID-19.

4.5 Leading Causes of Death by Gender in Infant and Child

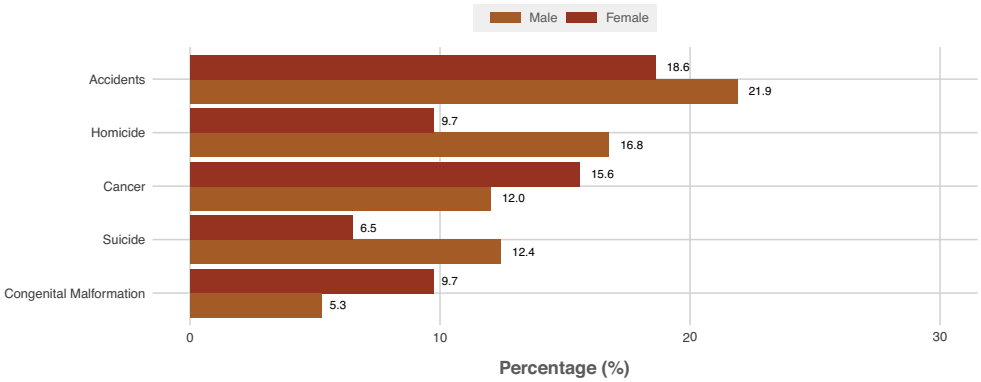
Figure 4.9 shows that there was no gender difference in the leading cause of death for infants.

Figure 4.9 Leading Causes of Death Contributing to Infant Deaths by Gender Harris County, 2016-2020



In older children, accidents, suicide, and homicide accounted for a higher proportion of death in males than in females. Cancer and congenital malformation accounted for a higher proportion of death in female children than in male children (Figure 4.10).

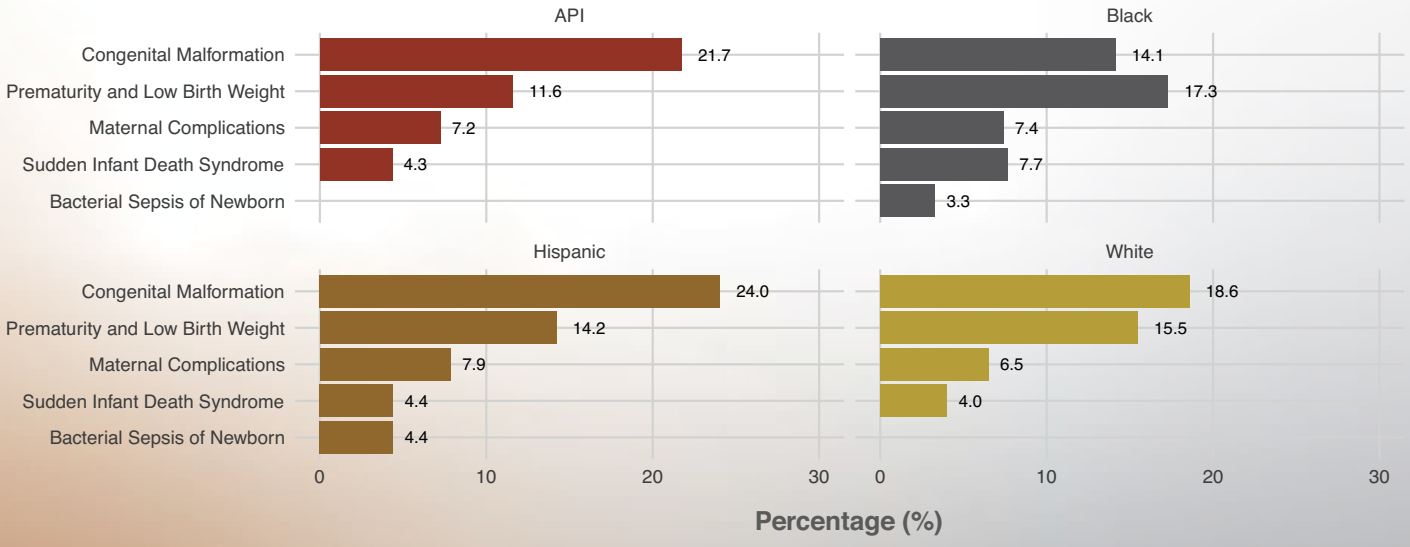
Figure 4.10 Leading Causes of Death Contributing to Child Deaths by Gender Harris County, 2016-2020



4.6 Leading Causes of Infant Death by Race/Ethnicity

Between 2017 and 2020, 50.0% of newborns in Harris County were Hispanic, 22.4% were White, 19.2% were Black, and 6.77% were API. Figure 4.11 shows that congenital malformation was the leading cause of death for API, Hispanic, and White infants. Among the 396 infants who died of congenital malformation in Harris County between 2016 and 2020, 208 were Hispanic (52.5% of the total). About one-third of Hispanic infant deaths were attributable to congenital malformation. Low birth weight was the leading cause of death for Black infants. Among the 316 infants who died of prematurity or low birth weight, 131 were Black (41.4%) and 123 were Hispanic (38.9%). Although not being ranked in the top five leading causes of death, accidents were the fourth leading cause of death for White infants.

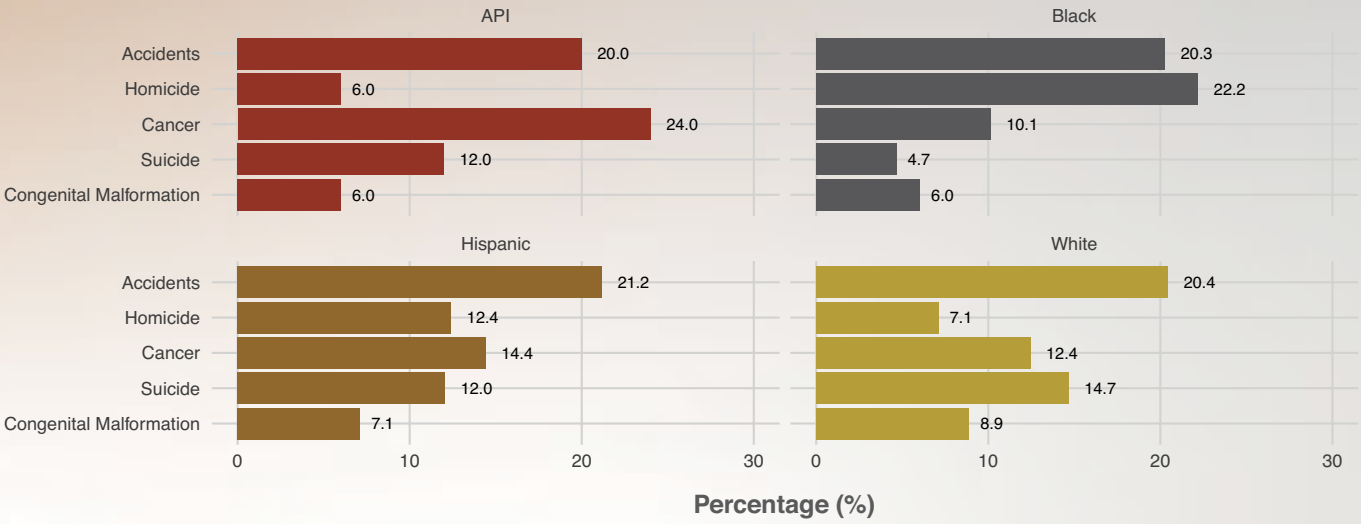
Figure 4.11 Leading Causes of Death Contributing to Infant Deaths by Race/Ethnicity Harris County, 2016-2020



4.7 Leading Causes of Child Death by Race/Ethnicity

Figure 4.12 shows the cause of death of older children by race/ethnicity from 2016 to 2020. Homicide-related deaths occurred more often in Black children and suicide-related deaths occurred more often in White children. Accidents accounted for approximately one-fifth of child deaths for all racial/ethnic groups.

Figure 4.12 Leading Causes Contributing to Child Deaths by Race/Ethnicity in Harris County, 2016-2020



"...**congenital malformation** was the *leading* cause of **death** for API, Hispanic, and white infants."

This section reviews specific underlying causes of death in more detail due to their impact to overall mortality or cause of death in Harris County. Atherosclerotic heart disease, chronic ischemic heart disease, lung cancer, and Alzheimer's disease were the leading underlying causes of death in Harris County between 2016 and 2020. Each caused more than 1,000 deaths yearly, beside COVID-19 in 2020.

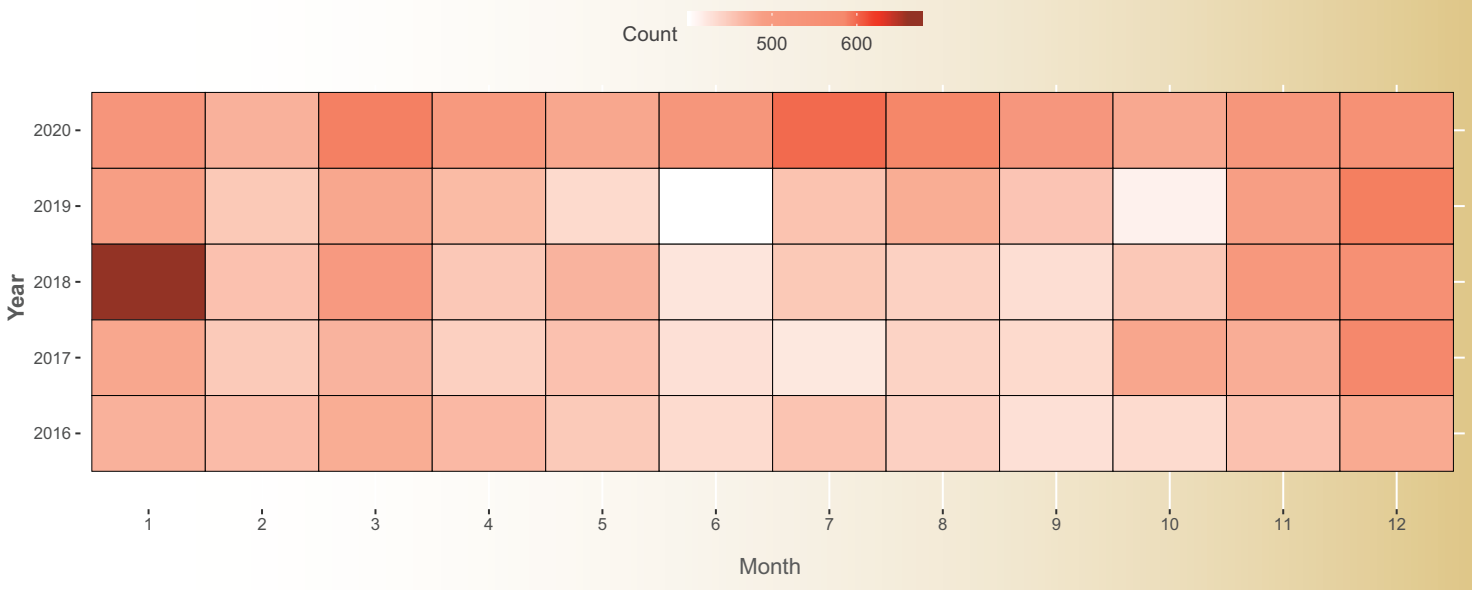
5.1 Heart Disease

Heart disease was the cause of 30,216 deaths in Harris County and accounted for 21.7% of the total deaths between 2016 and 2020. The age-adjusted mortality rate of heart disease had slightly decreased between 2016 and 2019 but it increased in 2020. Figure 5.1 below shows the heart disease death count was higher by more than 9.0% between March 2020 and October 2020 when compared to March through October of 2019.

"**Heart disease** was the cause of ***30,216*** **deaths** in Harris County, and accounted for **21.7%** of total deaths between ***2016 and 2020.***"

Section 5: Underlying **Cause** *of* **Death**

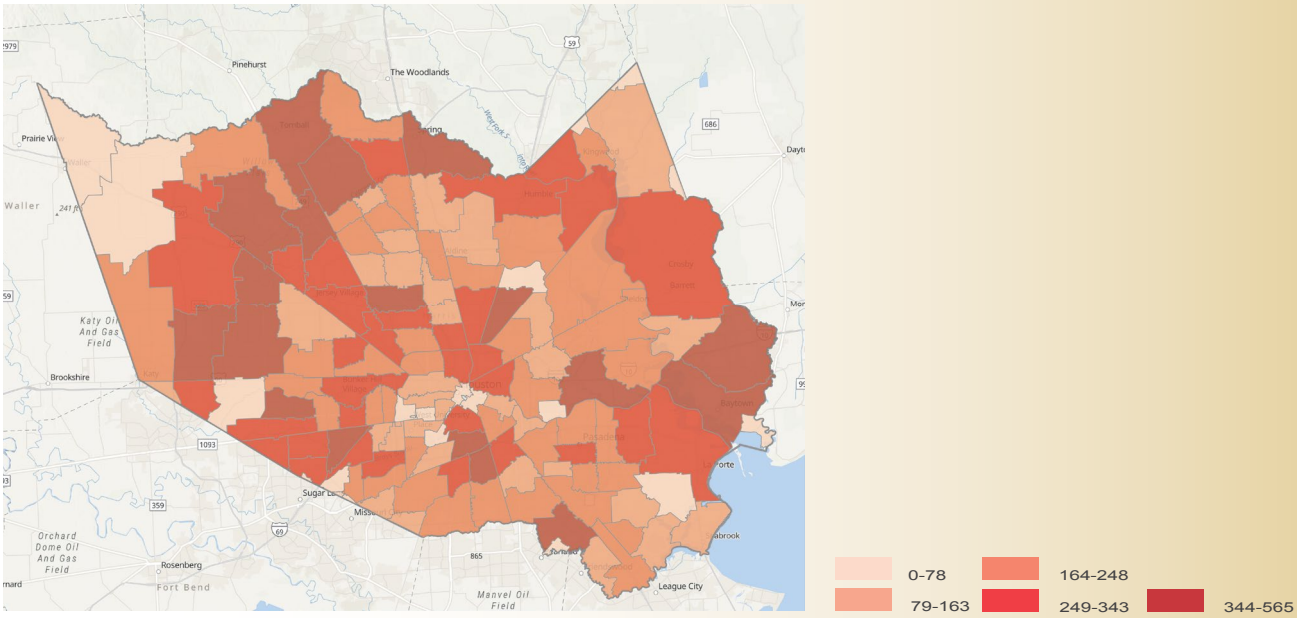
Figure 5.1 Heart Disease Death by Calendar Months in Harris County, 2016-2020



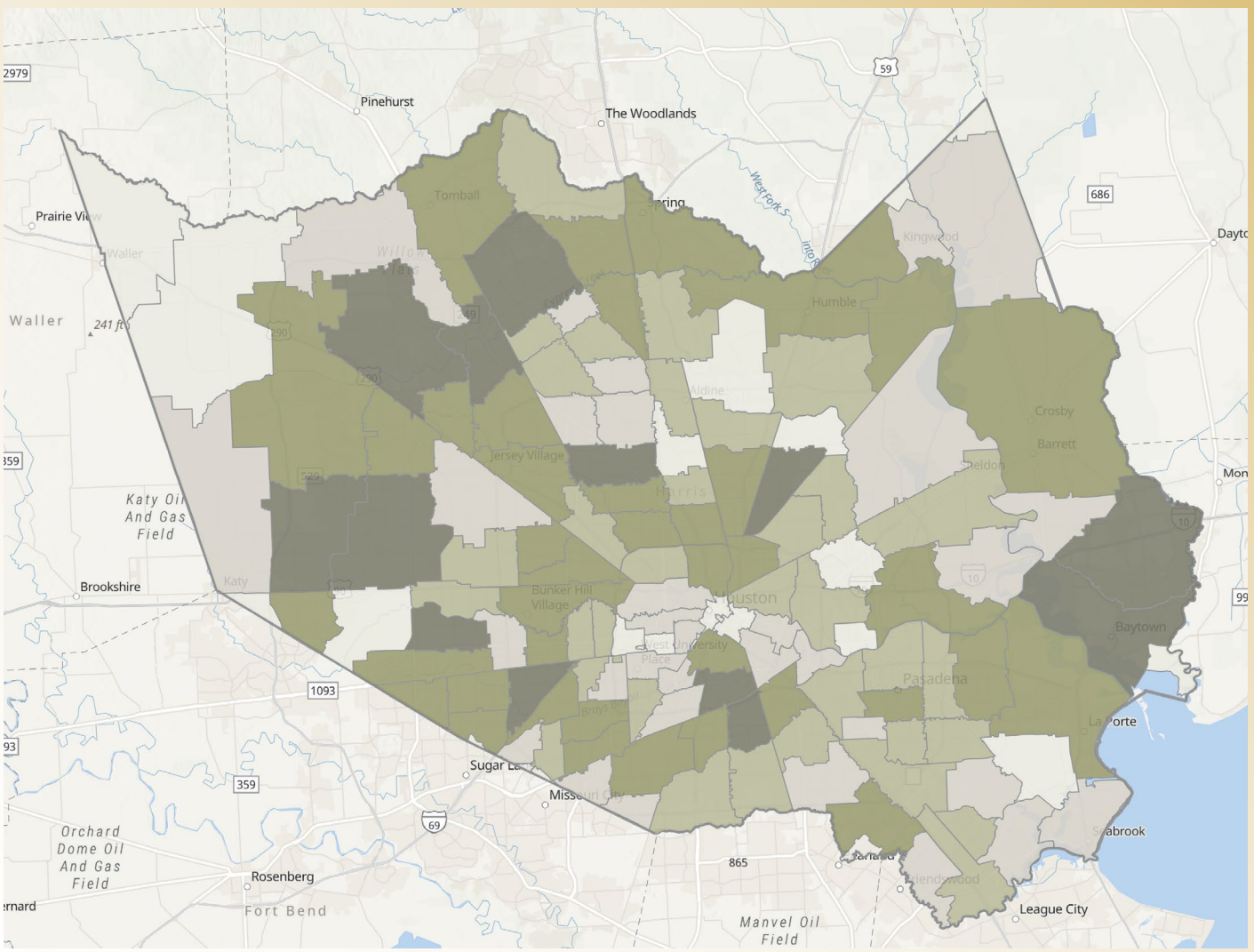
The most common underlying causes of death related to heart disease were atherosclerotic heart disease, chronic ischemic heart disease, myocardial infarction, heart failure, and hypertensive heart disease. The age-adjusted mortality rate of hypertension-related death fluctuated year by year, but it increased by 13.8% in 2020 compared to 2019.

Lastly, cardiovascular diseases, including heart disease and cerebrovascular disease, accounted for 27.1% of total deaths between 2016 and 2020. Map 5.1 and Map 5.2 show the distribution of accumulated deaths due to heart disease and cerebrovascular disease in Harris County between 2016 and 2020, respectively.

Map 5.1 Heart Disease Death by Zip Code in Harris County, 2016-2020



Map 5.2 Cerebrovascular Disease Death by Zip Code in Harris County, 2016-2020



5.2 Cancer

From 2016 to 2020, 27,945 cancer deaths accounted for 20.1% of the total deaths in Harris County, and 17.4%-21.2% of the total deaths each year. Cancers of the lung (19.7%), colon-rectum (10.0%), breast (8.14%), pancreas (7.42%), prostate (4.98%), liver and intrahepatic bile ducts (6.49%), and brain (3.08%) were the leading causes of cancer deaths in the entire population. Breast cancer accounted for 16.9% of cancer deaths in women and prostate cancer accounted for 9.53% of cancer deaths in men. Following lung cancer, breast cancer and prostate cancer were the second leading causes of cancer death in women and men respectively. It is noted that 336 women younger than 50 years old and 22 men died of breast cancer between 2016 and 2020.

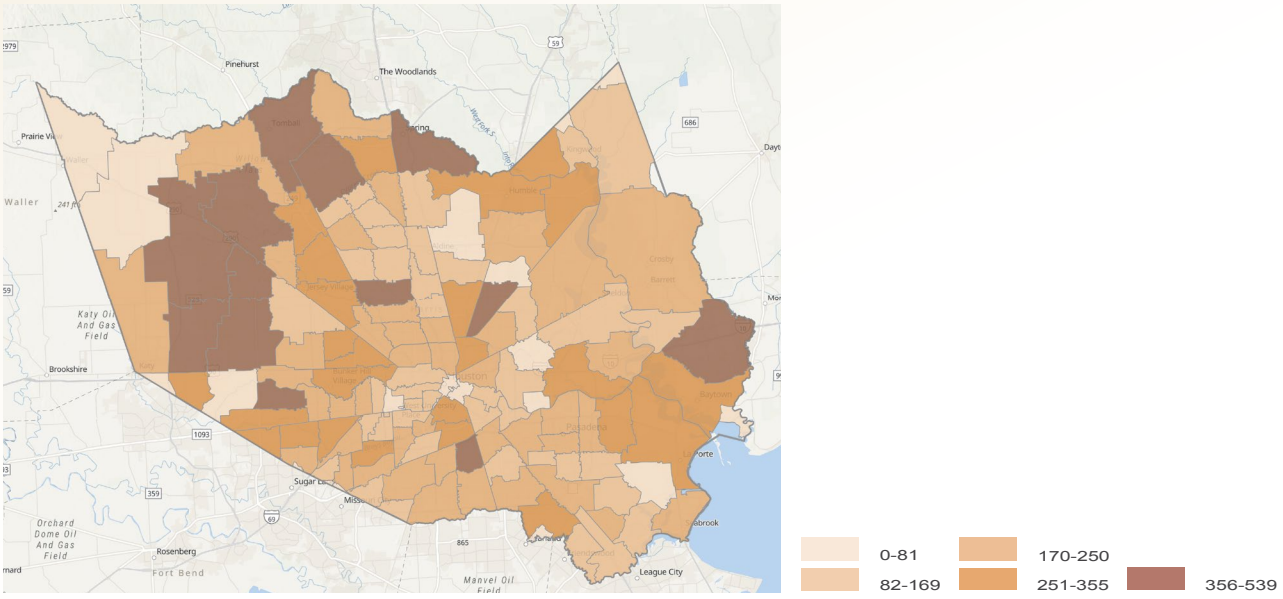
The age-adjusted mortality rates of lung cancer, breast cancer, and colorectal cancer have declined since 2016. There was an increase in the breast cancer death count in 2018 and 2019, but a drop in 2020. Pancreatic cancer is the third leading cause of death in women and the fourth leading cause of cancer death in men. The age-adjusted mortality rate of pancreatic cancer increased slightly from 2016 to 2018, then reduced in 2019, and increased again in 2020 by 16.5%. In addition, the mortality rates of multiple myeloma and kidney cancer increased substantially in 2020 compared to 2019 and the previous four years.

The mortality rate of liver cancer increased slightly since 2016, similar to the trend across the U.S. The age-adjusted mortality rate of liver cancer was highest in the Hispanic population. Chronic liver disease and cirrhosis are some of the risk factors for liver cancer and was the sixth leading cause of death in Hispanics, and the tenth leading cause of death in the entire population from 2016 to 2018, and 2020 (excluding COVID-19).

Blacks had the highest cancer mortality rate between 2016 and 2020, followed by Whites and Hispanics. APIs had the lowest cancer mortality rate. Death due to cancer is uncommon in children, a total of 167 children under 18 years of age died of cancer. Leukemia, brain cancer, and cancer of connective and soft tissues were the leading causes of cancer deaths in children.

Geographically, certain zip codes had a higher burden of cancer death than other zip codes (Map 5.3).

Map 5.3 Cancer Death by Zip Code in Harris County, 2016-2020



5.3 Accidents

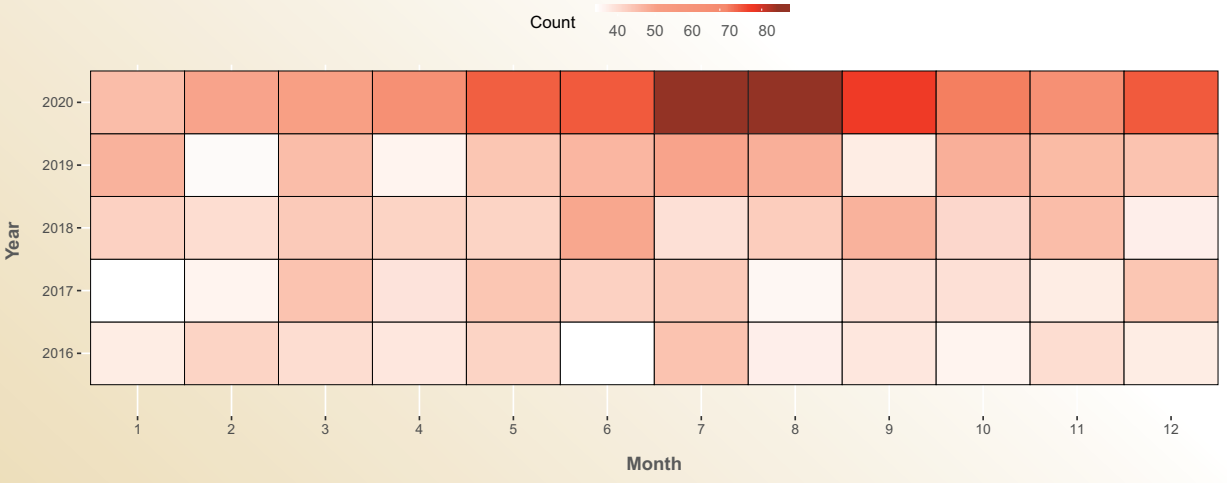
Accidents are one of the leading causes of premature death. These include transport accidents and non-transport accidents, such as falls, unintentional poisoning/drug overdoses, drownings, etc. Death due to accidents occurred more frequently among specific age groups in Harris County.

The numbers of transportation-related deaths ranged from 477 to 570 every year and contributed to a total of 2,667 deaths between 2016 and 2020. Residents younger than 20 years of age had a lower rate of transportation-related death, but the rate increased sharply in those 20-29 years of age. The morality rate then reduced among those 30-39 years of age but increased gradually as people aged. Men were more than twice as likely to die in transportation-related accidents than women, in all age groups. Blacks had the highest age-adjusted mortality rate of transport accidents between 2016 and 2020. Hispanics accounted for 39.2% of total transport accident-related death. The mortality rate of transport accidents has remained stable since 2016. However, there was an 11.9% increase in transportation-related death count in 2020 compared to 2019. A total of 94.6% transport accident death was attributable to motor vehicle accidents. There was a 13.3% increase in motor vehicle-related death count in 2020 compared to 2019.

A total of 290 children died of accidents between 2016 and 2020, including 42 infants. For infants, the most common deadly accident was suffocation and strangulation in bed. For children (1-17 years of age), the most common deadly accidents were drowning in swimming-pool and transport accidents.

The most common deadly accident in adults (18-59 years of age) was unintentional drug overdose. The death was mostly seen among those 30 to 59 years of age, and it was higher in men than in women. Whites had two times higher age-adjusted mortality rate of unintentional drug overdose than other races/ethnicities. The death counts due to unintentional drug overdose increased by 45.8% in 2020 compared to 2019, and the increase was seen for all racial/ethnic groups. The age-adjusted mortality of unintentional drug overdose increased since 2017, and it increased by 57.7% in 2020 compared to 2019. Figure 5.2 shows that in 2020, the death counts due to drug overdose steadily increased since March and peaked when COVID-19 deaths peaked in July and August of 2020.

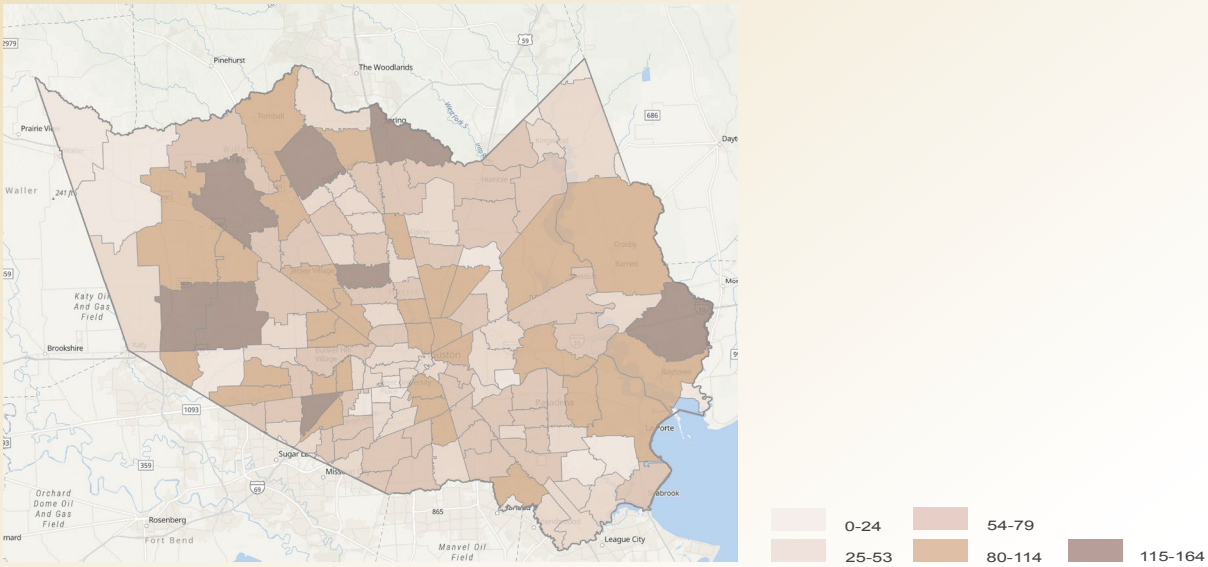
Figure 5.2 Unintentional Drug Overdose Death by Calendar Months in Harris County, 2016-2020



The mortality rate of other non-transport accidents increased as the population aged, and it tripled in people 75 years or older compared to people 45-54 years of age. The most common fatal accident in those older residents was falls. Among 1,623 residents aged 75 or older who died of accidents, 66.3% died of falls. Among 1,789 residents who died of falls, 1,076 (60.1%) were aged 75 or older. Among 1,076 older residents who died of falls, 64.9% were White and 54.4% were women. The death count from falls had been stable from 2016 to 2019 but increased by 26.4% in 2020.

Map 5.4 shows that certain areas in Harris County had a higher mortality burden of accidents than other areas.

Map 5.4 Accidents Death by Zip Code in Harris County, 2016-2020

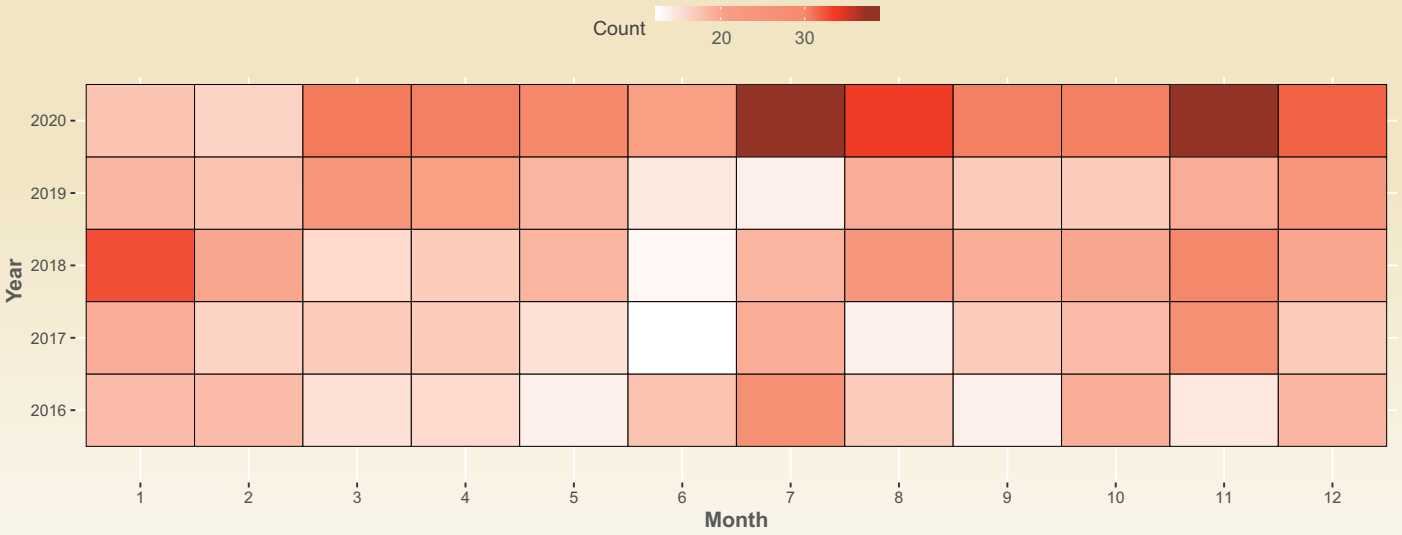


5.4 Neurodegenerative Diseases

Alzheimer's disease and Parkinson's disease caused 4.67% of the total deaths in Harris County between 2016 and 2020. A total of 89.0% of deaths due to Alzheimer's disease and Parkinson's disease occurred in those age 75 or older. The age-adjusted mortality rates of Alzheimer's disease and Parkinson's disease have been stable between 2016 and 2019 and increased by 11.5% for Alzheimer's disease and by 39.7% for Parkinson's disease in 2020 compared to 2019. In addition, the age-adjusted mortality of senile degeneration of the brain has increased steadily since 2016. A total of 86.2% of deaths from senile degeneration of brain also occurred in those aged 75 or older. Unspecified dementia ranked as the tenth leading underlying cause of death and caused 2,559 deaths between 2016 and 2020. A total of 81.4% deaths due to unspecified dementia occurred in residents aged 80 or older.

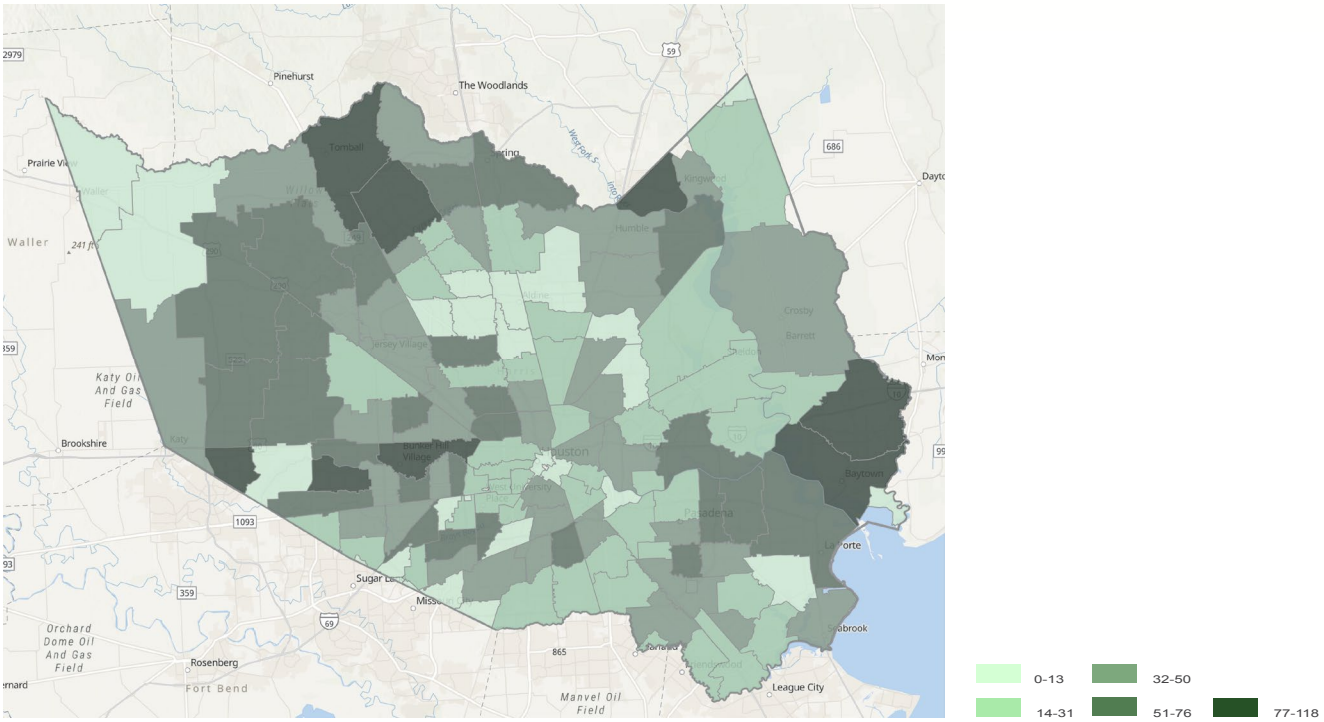
Women had a higher age-adjusted mortality rate of Alzheimer's disease than men. Men had a higher age-adjusted mortality rate of Parkinson's disease than women. Whites had the highest mortality rate of neurodegenerative disease, followed by Blacks and then Hispanics. For example, the age-adjusted mortality rate (per 100,000 persons) for Parkinson's disease in Whites at 10.6 was more than double the mortality rate of Blacks at a rate 5.25 and 4.8 for both API and Hispanic populations. Figure 5.3 shows that in 2020, the deaths from Alzheimer's disease and Parkinson's disease were higher than the deaths from the same causes in the same months of previous years. The count peaked in July and August of 2020 when the COVID-19 death count also peaked.

Figure 5.3 Alzheimer's Disease and Parkinson's Disease Deaths by Calendar Months in Harris County, 2016-2020



Map 5.5 shows the mortality burden of Alzheimer's disease in Harris County by zip code.

Map 5.5 Alzheimer's Disease Death by Zip Code in Harris County, 2016-2020



5.5 Other Death Trends

The death counts for all underlying causes (by a single ICD code) have been largely stable, though some causes fluctuated or decreased between 2016 and 2020. However, the following causes (ICDs) showed a consistent upward trend through these five years:

- Liver Cancer (C229)
- Endometrial Cancer (C541)
- Diabetes (E119)
- Alzheimer's Disease (G309)
- Senile Degeneration of Brain (G311)
- Specified Degenerative Disease of Nervous System (G318)
- Hypertensive Heart and Chronic Kidney Disease (I132)
- Cerebral Infarction (I639)
- Unspecified Bacterial Pneumonia (J159)
- Unintentional Drug Overdose (X44)

The death due to some causes had been stable in the previous years, but increased by more than 30% in 2020 compared to 2019, include:

- Kidney Cancer (C64)
- Multiple Myeloma (C900)
- Severe Malnutrition (E43)
- Alcohol Dependence (F102)
- Cardiac Arrhythmia (I499)
- Parkinson's Disease (G20)
- Degenerative Disease of The Nervous System (G319)
- Alcoholic Cirrhosis of Liver (K703)
- Sudden Infant Death Syndrome (R95)
- Unintentional Drug Overdose (X41, X44)
- Homicide (X95)

Notably, the increase in the death count was by more than 60% in 2020 for:

- Multiple Myeloma (C900)
- Alcohol Dependence (F102)
- Degenerative Disease of The Nervous System (G319)
- Unintentional Drug Overdose (X41)

"There were **2,832 *deaths*** in this single month and made it not only the **deadliest** month between **2016 and 2019,** but the **deadliest** month of *non-COVID* causes..."

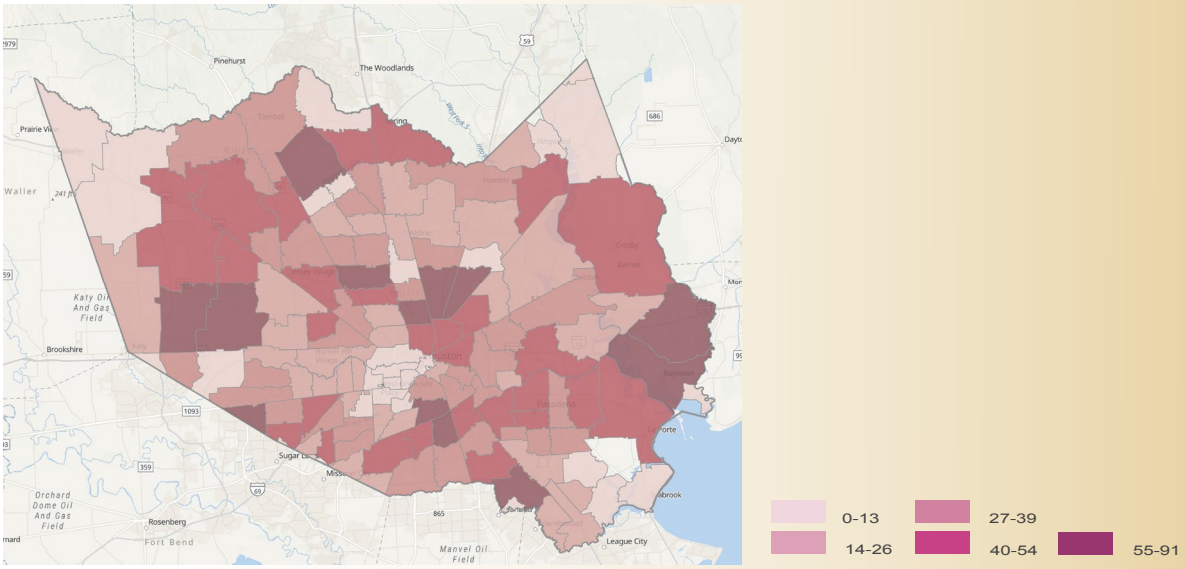
A total of 72.8% of deaths due to alcohol dependence and 89.5% of deaths due to drug overdose (X41 and X44) occurred in those 18-59 years old in 2020.

The analysis shows a spike in the death count in January of 2018. There were 2,832 deaths in this single month and made it not only the deadliest month between 2016 and 2019, but the deadliest month of non-COVID causes between 2016 and 2020. The death counts increased for all leading causes of death in January of 2018 compared to January of 2017, including influenza and pneumonia by 143%, Parkinson's disease by 56.5%, kidney disease by 50.9%, chronic lower respiratory diseases by 44.4%, septicemia by 40.3%, diabetes by 32.4%, and heart disease by 29.7%. The second deadliest month was December of 2017. It remains to be determined whether hurricane Harvey, which stalled around Harris County between August 26 and 29 of 2017, had any direct or indirect impact on the mortality in Harris County because of disrupted health/medical care, harmful living environment due to flooding, or other related causes.

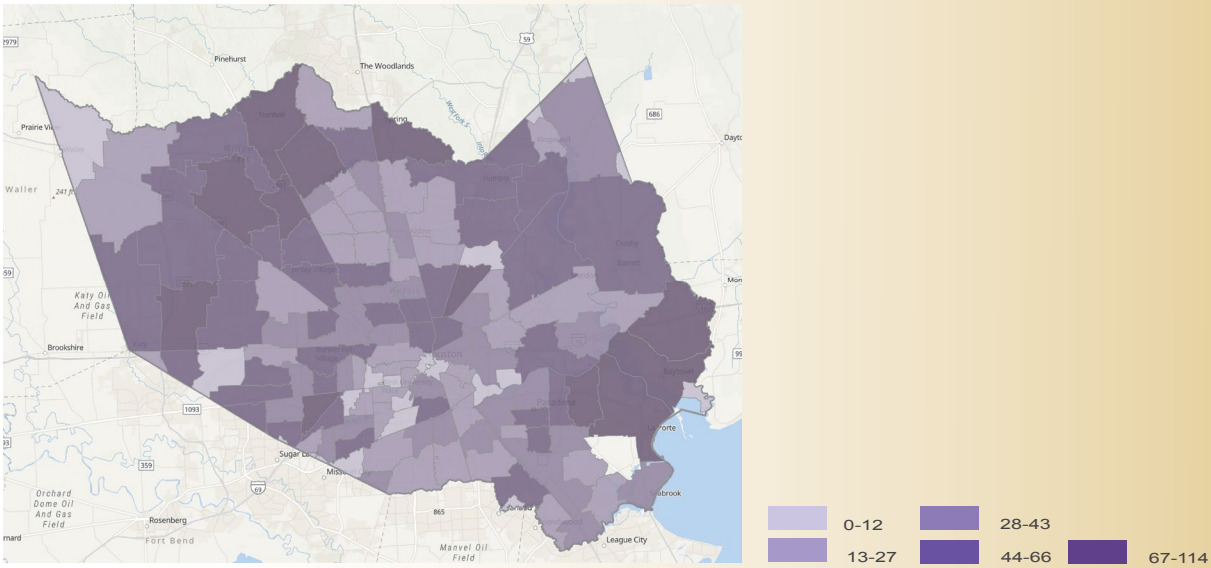
Section 6: Mapping Other **Leading** *Causes of* **Death**

There were geographic disparities of cause-specific deaths in Harris County for COVID-19, heart disease, cancer, accident, and Alzheimer's disease as shown above. Map 6.1 through Map 6.4 show that the death due to chronic lower respiratory diseases, diabetes, septicemia, and kidney disease also differed by zip code in Harris County.

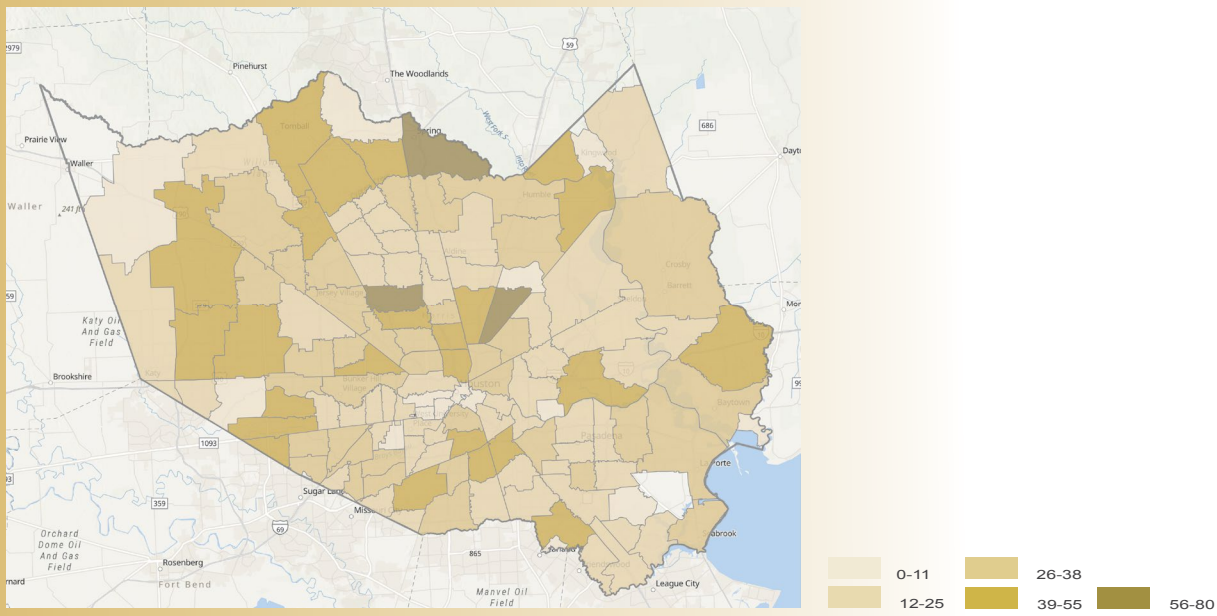
Map 6.1 Diabetes Death in Harris County, 2016-2020



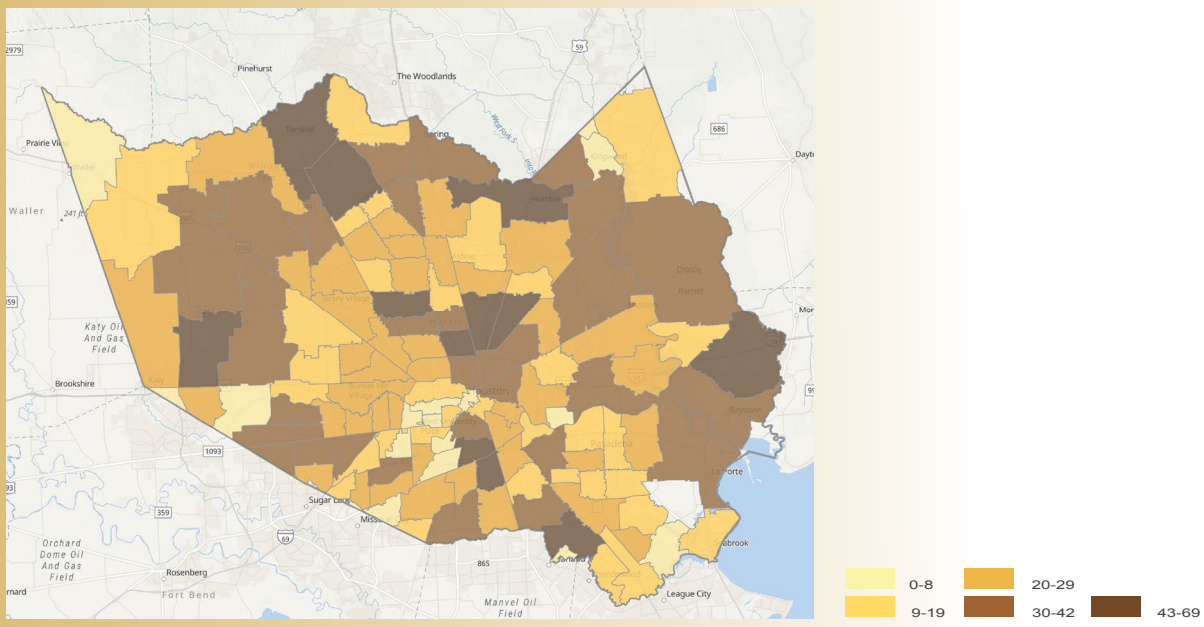
Map 6.2 Chronic Lower Respiratory Diseases Death in Harris County, 2016-2020



Map 6.3 Septicemia Death in Harris County, 2016-2020



Map 6.4 Kidney Disease Death in Harris County, 2016-2020



However, the distribution of the mortality count could be related to the population density in addition to social determinants in each area.

Vital statistics data provide a comprehensive view of the mortality burden and related causes in a community. This report highlights that the mortality rate rose in Harris County in 2020 after being stable, or trending downward, between 2016 and 2019. The death count increased by 22.8% and the age-adjusted mortality rate increased by 21.9% in 2020 compared to 2019. The increased mortality rate was not only due to COVID-19, but also due to other causes, including heart disease, diabetes, substance use (drugs or alcohol), Alzheimer's disease, and homicide. Both mortality rate and leading causes of death showed disparities by age, sex, race/ethnicity, and geographic areas. In 2020, Hispanics experienced the most loss of life from COVID-19, whereas Whites had the least deaths from the pandemic. COVID-19 had no impact on infant and child mortality in 2020. The infant and child mortality rates were lowest in 2020 in Harris County.

Deaths due to chronic diseases make up a significant number of deaths representing a major mortality burden in Harris County. Heart disease and cancer are the dominantly leading causes of death in Harris County. Heart disease impacts lives of older residents much more than younger residents. Cancer impacts the lives of younger and older residents, but the mortality rates of cancers of the lung and breast have decreased, and liver cancer has increased. Accidents (such as drug overdose or injury), homicide, and suicide were the major causes of death in younger residents, particularly in men.

Alzheimer's disease, Parkinson's disease, and other neurodegenerative diseases were the leading causes of death in residents older than 75 years of age.

Section 7: Conclusion

The short- and long-term impact of COVID-19 and its effect on heath and mortality should continue to be monitored in the following years. The societal characteristics of health, mortality, and leading causes of death are yet to be determined. Preventive measures can be implemented to increase life expectancy and reduce premature death in Harris County. For example, the Hispanic population would benefit most from the preventive measures for COVID-19.

"**Deaths** due to *chronic diseases*, make up a **significant number** of deaths representing a major **mortality burden** in *Harris County*."

Section 8: Technical Notes

8.1 Data Sources

Data sources in this report include vital statistics from the Texas Department of State Health Services (DSHS) and the U.S Census Bureau American Community Survey (ACS) one-year estimates for population size. Death data were obtained from all death certificates filed in Texas between 2016 and 2020. Sex information was missing for one record. The total death in Harris County in 2020 was provisional. The live birth data were available from 2017 to 2020. Additional information of each data source is included in Section 10.

8.2 Definitions and Calculation Methods

Life expectancy at birth is defined as the average number of years that a newborn could expect to live, according to the current mortality experience (age-specific death rates) of Harris County in each period.

The data on life expectancy at birth for Harris County, Texas, and United States were obtained from county health rankings based on the data from 2017 to 2019.

The measures of mortality included death count, crude, age-adjusted, and age-specific mortality rate per 100,000 persons for each year or for all five years from 2016 to 2020. Mortality rate, also known as death rate, measures the frequency of occurrence of death in a defined population in a specific time interval.

Crude mortality rate, also known as crude death rate, measures the frequency of occurrence of death in a defined population in a specific time interval. Crude mortality rates are calculated for demographic factors, all-cause, leading causes or underlying causes using the number of deaths divided by the populations that are relevant. We present crude mortality rate in infant (12 months or younger) and children (aged 1-17 years) and in age-specific groups (such as for 10-year age-group). The mortality rate is expressed as per 100,000 persons. However, the crude mortality rate does not consider the potential difference in the age structure of the population being compared, such as by time, geographic areas, or demographics (such as race or sex).

Age-adjusted mortality rate, also known as age-standardized mortality rate, is a death rate that controls for the effect of difference in the age distribution of the populations being compared given age is the prime factor in death. Age-adjusted death rates are better indicators than crude death rate for examining the changes in the risk of death over 2016-2020 when Harris County's population structure may have changed. Age-adjusted mortality rate (per 100,000 persons) was standardized to the 2000 U.S. Standard Population using the direct method applying the same age grouping and proportions as established by the National Center for Health Statistics of the Department of Health and Human Services (DHHS).

Cause-specific mortality rate is the mortality rate from a specific cause for a population. The numerator is the number of deaths attributed to a specific leading cause or underlying cause of death, such as cancer or heart disease. The denominator is the size of the population at the midpoint of each year. The age-adjusted cause-specific mortality rate is also expressed as per 100,000 persons.

Infant mortality rate refers to the probability of deaths of children 12 months or younger per 100,000 persons. The infant mortality is also calculated as the probability of deaths of children 12 months or younger per 1000 live births based on the data of 2017 to 2020.

Child mortality rate refers to the child mortality refers to the probability of deaths of children 1-17 years of age per 100,000 persons of this age.

The populations used to calculate death rate for each year is based on the one-year estimate. Population for infants is estimated as one tenth of

the population of those 0-9 years of age. The race/ethnicity is grouped as Hispanic, White, Black, and API. The Hispanic population includes persons of any race, Latinos and Mexicans. Whites, Blacks, and APIs are non-Hispanic. Because the population estimates for 2020 are not yet available at this time of this report, we used the midpoint population of 2019 as the surrogate when calculating the mortality rate for 2020. According to the U.S. census estimate, the population size on April 1, 2020 was 4,731,145, which shows a slight increase from 4,713,325 on July 1, 2019.

Underlying cause of death: Cause of death statistics, mainly death count, presented in the report are classified according to the International Statistical Classification of Diseases and Related Health Problems 10th Revision (ICD-10). The World Health Organization (WHO) specifies that member nations classify, and code causes of death in accordance with the current version of the ICD.

The underlying cause of death is defined “the disease or injury which initiated the train of morbid events leading directly to death, or the circumstances of the accident or violence which produced the fatal injury” according to WHO.

Leading causes of death: Ranked according to the number of deaths assigned by ICD-10. 113 selected causes of death defined by National Center for Health Statistics.

Years of potential life lost (YPLL): To evaluate premature death due to COVID-19, we calculated the YPLL for each racial/ethnic group using 75 years as the end point. YPLL is the numeric difference between 75 and the age at death of COVID-19. YPLL rate per 100,000 persons in each racial/ethnic group was calculated.

The R program (version 4.0.3) was used to perform data analysis and generate tables and figures. The ESRI ArcGIS pro (version 2.8) was used to build maps.

The mortality rate of this report should not be compared to CDC WONDER because the population sizes maybe different. The analysis based on ICD codes could be affected by the coding practice through the years and need to be interpreted with caution. The trend shown for the death count does not incorporate the change of the population size. No statistical significance was inferred for this report.

Section 9: References

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Section 10: Appendix

10.1 ICD codes

Cause of Death	ICD-10 code
Septicemia	A40, A41
Human immunodeficiency virus (HIV) disease	B20-B24
Malignant neoplasms (Cancer)	C00-C97
Malignant neoplasms of esophagus	C15
Malignant neoplasms of stomach	C16
Malignant neoplasms of colon and rectum	C18-C21
Malignant neoplasms of liver and intrahepatic bile ducts	C22
Malignant neoplasms of liver	C229
Malignant neoplasm of pancreas	C25
Malignant neoplasms of trachea, bronchus, and lung	C33-C34
Malignant neoplasms of bone and articular cartilage of limbs	C40
Malignant melanoma of skin	C43
Malignant neoplasms of other connective and soft tissue	C49
Malignant neoplasm of breast	C50
Malignant neoplasm of cervix uteri	C53
Malignant neoplasm of endometrium	C541
Malignant neoplasm of corpus uteri	C54-C55

Cause of Death	ICD-10 code
Malignant neoplasm of ovary	C56
Malignant neoplasm of prostate	C61
Malignant neoplasm of kidney and renal pelvis	C64-65
Malignant neoplasm of bladder	C67
Malignant neoplasm of meninges, brain and other parts of central nervous system	C70-C72
Malignant neoplasms of lymphoid, hematopoietic, and related tissue	C81-C96
Multiple myeloma	C900
Diabetes mellitus (Diabetes)	E10-E14
Type 2 diabetes without complications	E119
Severe protein-calorie malnutrition	E43
Dementia (unspecified)	F03
Alcohol independence	F102
Neurodegenerative Diseases	G20, G21, G30, G31
Parkinson's disease	G20, G21
Alzheimer's disease	G30
Senile degeneration of brain, not elsewhere classified	G311
Specified degenerative disease of nervous system	G318
Degenerative disease of nervous system	G319
Diseases of heart (Heart disease)	I00-I09, I11, I13, I20-I51
Hypertensive heart disease and renal disease	I13
Hypertensive heart disease with heart failure and stage 5 chronic kidney disease	I132
Essential hypertension and hypertensive renal disease (hypertensive renal disease)	I10, I12, I15
Atherosclerotic cardiovascular disease	I250
Cardiac arrhythmia	I499
Cerebrovascular diseases (Stroke)	I60-I69
Cerebral infarction	I639
Influenza and pneumonia	J09-J18
Unspecified bacterial pneumonia	J159
Chronic lower respiratory diseases	J40-J47
Chronic liver disease and cirrhosis	K70, K73-K74
Alcoholic cirrhosis of liver	K703
Nephritis, nephrotic syndrome, and nephrosis (Kidney Disease)	N00-N07, N17-N19, N25-N27
Congenital malformation, deformations, and chromosome abnormality	Q00-Q99
Newborn affected by maternal complications of pregnancy	P01
Disorders related to short gestation and low birth weight	P07
Bacterial sepsis of newborn	P036
Sudden infant death syndrome	R95
COVID-19	U071
Accident	V01-X59, Y85-Y86
Transport accidents	V01-V99, Y85
Motor vehicle accidents	V02-V04,V09.0, V09.2,V12-V14, V19.0-V19.2, V19.4-V19.6, V20-V79, V80.3-V80.5, V81.0-V81.1, V82.0-V82.1, V83-V86,

Cause of Death	ICD-10 code
Motor vehicle accidents	V87.0-V87.8, V88.0-V88.8, V89.0,V89.2
Non-transport accidents	W00-X59, Y86
Accidental drowning and submersion	W65-W74
Falls	W00-W19
Accidental poisoning and exposure to noxious substances	X40-X49
Unintentional drug overdose	X41, X42, X44
Exposure to antiepileptic, sedative-hypnotic, antiparkinsonism and psych	X41
Exposure to narcotics and psychodysleptics	X42
Exposure to other and unspecified drugs, medicaments and biological substances	X44
Intentional self-harm (Suicide)	X60-X84, Y87.0
Assault (Homicide)	X85-Y09, Y87.1

10.2 Detailed Description of Data Sources

1. American Community Survey (ACS): Since 2005, the Census Bureau has administered the ACS) annually. It is the only source of population estimates at the census level for intercensal years. The survey contains the changing demographic, social, economic, and housing characteristics for multiple geographies (state, county, census block group, census tract, Public Use Microdata Areas, ZIP Code Tabulation Areas, etc.) of the U.S.

Table 1.1 Age Distribution in Harris County, 2019
Table 1.2 Sex Distribution in Harris County, 2019
Table 1.3 Race/Ethnicity Distribution in Harris County, 2019

2. Robert Wood Johnson Foundation. Could where you live influence how long you live? [Web application]. Retrieved from https://www.rwjf.org/lifeexpectancy. This web application is based on the US Small-area Life Expectancy Estimates Project (USALEEP) which estimates life expectancy at birth for 2010-2015, by census tract. USALEEP estimated life expectancy at birth for the period 2010-2015, by census tract. Death records of US residents (excluding residents of Maine and Wisconsin) for deaths in 2010 to 2015 were geocoded based on descendants' residential addresses. Statistical modeling based on population estimates (2016 ACS 5-Year Estimates, US Census Bureau) is used to address issues associated with small population sizes and missing age-specific death counts.

Figure 2.1 Life Expectancy at Birth Overall and by Race/Ethnicity in Harris County, Texas, and United States, 2018
Map 2.1 Life Expectancy by Census Tracts in Harris County, 2010-2015

3. Texas Department of State Health Services (DSHS): the Texas Health Data by the DSHS provides vital statistics data to HCPH. The vital statistics refers to demographic data on birth, deaths, fetal deaths, marriage, and divorces. The vital statistics of Center for Health Statistics are the main data resource for Texas public health studies.

Table 3.1 Yearly All-Cause Crude and Age-Adjusted Mortality Rates in Harris County, 2016-2020
Table 3.2 All-Cause Infant and Child Mortality Rates by Gender in Harris County, 2016-2020
Figure 3.1 Yearly Non-COVID-Cause Age-Adjusted Mortality Rates in Harris County, 2016-2020
Figure 3.2 Yearly All-Cause Age-Adjusted Mortality Rates by Sex in Harris County, 2016-2020
Figure 3.3 Yearly All-Cause Age-Adjusted Mortality Rates by Race/Ethnicity in Harris County, 2016-2020
Figure 3.4 Yearly Infant Mortality Rates in Harris County, 2016-2020
Figure 3.5 Yearly Infant Mortality Rates by Sex in Harris County, 2016-2020

10.3 Category of Causes of Death

Accident: transport, poisoning and exposure to noxious substances, drowning and submersion, fall, unintentional drug overdose.

Cerebrovascular diseases: stroke, subarachnoid hemorrhage, intracranial hemorrhage, sequelae of cerebrovascular disease

Chronic liver disease and cirrhosis: alcoholic liver disease, chronic hepatitis, fibrosis and cirrhosis of liver

Chronic lower respiratory diseases: bronchitis, emphysema, asthma, other lower respiratory diseases

Heart disease: acute rheumatic fever and chronic rheumatic heart diseases, hypertensive heart disease, hypertensive and renal disease, ischemic heart disease, pulmonary heart disease and disease of pulmonary circulation, other heart diseases

Kidney disease: acute and rapidly progressive nephritic and nephrotic syndrome, renal failure, chronic glomerulonephritis, nephritis and nephropathy.

10.4 Abbreviations

ACS: American Community Survey
API: Asians/Pacific Islander
COVID-19: Coronavirus Disease 2019
DSHS: Department of State Health Services
HCPH: Harris County Public Health
ICD: International Classification of Diseases
SIDS: Sudden Infant Death Syndrome
YPLL: years of potential life lost
WHO: World Health Organization

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